

**Addendum to the Final Areawide
Environmental Impact Statement
on Phosphate Mining in the
Central Florida Phosphate District**

July 2013

**U.S. ARMY CORPS OF ENGINEERS,
JACKSONVILLE DISTRICT**

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The Notice of Availability for the Final Area-wide Environmental Impact Statement (AEIS) on phosphate mining in the Central Florida Phosphate District was published in the Federal Register on May 3, 2013. Subsequent to that publication date, the lead agency for the AEIS, the United States Army Corps of Engineers, Jacksonville District (USACE) determined that there were comments received on the Draft AEIS during the comment period that were not responded to in the Final AEIS, that a Spanish language translation of the Executive Summary of the Final AEIS that was described in the Draft AEIS had not been prepared, and that corrections were needed for part of the surface water hydrology analysis.

NEPA requires preparation of a supplement to a final EIS where:

- (i) the agency makes substantial changes in the proposed action that are relevant to environmental concerns; or
- (ii) there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or impacts. (40 C.F.R. § 1502.9(c)(1))

The USACE has not made substantial changes to the proposed action relevant to environmental concerns. Furthermore, the USACE has determined that the new information outlined above is not significant new information relevant to environmental concerns and bearing on the proposed action or impacts.

In the case of the comments received and not included, the Final AEIS already addresses the concerns raised, as described in the table of comments and responses attached to this Addendum as Appendix A. For the Spanish language Executive Summary, there will be a 30-day period following the Notice of Availability for this Addendum to provide the public with additional time for review; however, there are no changes in the content of the Executive Summary. Finally, the revised surface water hydrology analysis now shows that the four proposed phosphate mines individually and cumulatively have less impact on predicted stream flows with 50% capture of stormwater within the mine boundaries than with 100% capture of stormwater under both average rainfall and low rainfall scenarios. However, these changes do not change the determinations of significance or effect made for any of the alternatives, including the Applicants' Preferred Alternative, that are stated in the Final AEIS. As described in the Final AEIS, the Corps will do further project-specific analyses of the proposed projects' impacts on surface water flows as part of the project-specific public interest reviews and 404(b)(1) Guidelines analyses.

Therefore, the USACE has prepared this Addendum to respond to the comments received during the comment period on the Draft AEIS which were not included in the Final AEIS, to provide the Spanish language translation of the Executive Summary, and to provide the corrections to the surface water hydrology analysis. The table of comments and responses and the comments received are attached as Appendix A, the Spanish language translation of the Executive Summary is attached as Appendix B, and the summary of the corrections and the replacement pages for the Final AEIS with the corrections are attached as Appendix C.

The USACE will file this Addendum with the US Environmental Protection Agency for publication in the Federal Register. The USACE will also publish a public notice for the Addendum, provide copies of the Addendum to the parties listed in the Final AEIS distribution list including the libraries that received the Final AEIS, and make the document available on the AEIS website: www.phosphateaeis.org. There will be a 30-day review period following the publication of the Notice of Availability of the Addendum in the Federal Register. The USACE will accept comments on the Final AEIS and on the Addendum during this period, and will continue to accept comments until final action is taken on each of the four proposed actions considered in the AEIS.

Appendix A:
Comments Received on the Draft
AEIS Not Included in the Final AEIS
and Comment and Response Tables

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Appendix A:
Comments Received on the Draft
AEIS Not Included in the Final AEIS

Comment Source:
Paul Kripli

From: [Paul](#)
To: [Fellows, John P SAJ; teamaeis@phosphateaeis.org](mailto:teamaeis@phosphateaeis.org)
Subject: Regarding Phosphate mining in Florida- comments
Date: Tuesday, July 31, 2012 11:59:24 AM
Attachments: [AEIS Comments July 2012-14.pdf](#)

Please see the attached letter and my comments regarding the Phosphate Mining plan for Florida. This is a tragedy and needs to stop. The Phosphate is causing terrible environmental damage and polluting our water.

Paul Kripli
321-541-8122

From: [Terry Worthington](#)
To: ["teamaeis@phosphateaeis.org"](mailto:teamaeis@phosphateaeis.org)
Subject: Phosphate Industry's impact on local non-profits
Date: Monday, July 09, 2012 4:39:47 PM

Mosaic and CF Industries have contributed \$7,441,175 to the United Way of Central Florida over the last five years. The average gift from Mosaic employees is \$443.23 while CF employees contribute an average gift of \$428.08. United Way receives broad community support from other types of business, but those that work in the phosphate industry are unparalleled in their generosity. This is also true at the corporate level. Mosaic Company provides a dollar for dollar matching gift.

As the President of United Way of Central Florida I am fortunate to be involved in many respected community organizations. I see first hand the benefit that Mosaic provides to area Chambers of Commerce, public education, and individual non-profits. Mosaic is the leader in support that sustains our youth programs that elevate the importance of agriculture.

Mosaic and CF employees are also engaged as volunteers. Whether serving on a Board or pulling a fallen tree off the roof of a senior citizen's home, Mosaic and CF can be counted on to help. There is a culture of multidimensional engagement.

Without the Phosphate Industry in Polk and Hardee Counties this United Way's capacity to serve would be reduced by nearly 20%. Volunteers capable of performing major projects would be impossible to enlist. Our community's quality of life would be quite different without the wages and benefits that quality phosphate-related jobs provide. I'm sure others can explain what the taxes paid by the Phosphate Industry make possible or the recreational impact of the many industry provided parks.

I believe those that lead and work for CF Industries and Mosaic recognize the critical importance of environmental stewardship. This priority is consistent with the value placed on taking care of this generation and those that follow.

I respectfully urge that the AEIS economics analysis take into account the Phosphate Industry's impact on local non-profit agencies.

Invest Today. Impact Tomorrow.

Terry Worthington

President

United Way of Central Florida

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LIVE UNITED



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July 10, 2012

MR. JOHN FELLOWS, AEIS PROJECT MANAGER
DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
10117 PRINCESS PALM AVENUE, SUITE 120
TAMPA, FLORIDA 33610-8302

RE: Comments on Draft AEIS on Phosphate Mining in the CFPD

Dear Mr. Fellows,

The Florida Association of Mitigation Bankers (FAMB) represents the interests of mitigation banking in Florida and serves our members by monitoring regulatory decisions affecting the industry. The above-referenced draft AEIS has come to our attention because the document omits certain critical information and may lead decision-makers to conclusions not fully supported by federal rules for the compensation of aquatic resources losses (i.e., the 2008 Compensatory Mitigation Rule¹).

Please consider the following comments on the wetland mitigation proposed for the Chapter 5 – Mitigation – in the Draft AEIS.

1. Regarding the importance of hydrology, the Draft AEIS says in section 5.3.4,

“The development of appropriate hydrology is of vital importance to wetland and stream mitigation. Hydrology has and continues to be one of the most challenging aspects of wetland and stream design. Hydrologic predictions for early wetland designs were simple, full of assumptions, and often proved to be inadequate in capturing the hydrologic processes of the targeted wetland systems. Today, the phosphate industry uses sophisticated integrated surface water/groundwater modeling to predict target hydrologic conditions in mitigation wetlands and streams. Today’s advanced construction technology, such as laser and global positioning system (GPS)-guided earthmoving equipment, provides the means to precisely contour the land to achieve desired elevations and hydroperiods. Grading precision is particularly important for the design of shallow wetland systems that require subtle changes in elevation.”

¹ 33 CFR Parts 325 and 332, Federal Register Vol. 73 No.70, pages 19593 – 19075, April 10, 2008.

We agree that predicting the post-reclamation hydrology has been a challenge historically, but we fail to see how advances in technology have addressed the issue, especially the ability to do more precise grading. The problems of the past have been the inability to predict the post-reclamation water table, and the tendency of some post-reclamation soils to continue to subside. Precision grading in these circumstances could just make the grading more precisely wrong. We believe the risk of unsuccessful mitigation on mined sites is understated in the Draft AEIS, and that the above discussion should reflect the issues that have plagued the industry's post-reclamation (on-site) mitigation in the past, rather than optimistic speculation about the ability of new technology to resolve these issues.

2. Regarding the minimum requirement for determining mitigation success, the Draft AEIS says in section 5.3.7,

“The federal Section 404 program does not have minimum establishment periods for regulatory release of mitigation wetlands. Mitigation wetlands created to compensate impacts to waters of the United States are not considered for regulatory release at any specified time, only at the point when all success criteria are demonstrated to have been met.”

We believe a more accurate representation of the minimum establishment period is in the Compensatory Mitigation Rule, which states,

“The mitigation plan must provide for a monitoring period that is sufficient to demonstrate that the compensatory mitigation project has met performance standards, but not less than five years. A longer monitoring period must be required for aquatic resources with slow development rates (e.g., forested wetlands, bogs).”

We respectfully request that the Final AEIS reflect the requirements of the Compensatory Mitigation Rule.

3. Regarding the comparison of in-lieu fee programs to mitigation banks, the Draft AEIS states in section 5.5.2.2,

“In contrast [to an in-lieu fee program], an established commercial bank may have less flexibility with regard to addressing watershed needs, due to banks typically being single projects. Also, a permittee may have fewer options for selection of a location to implement a private mitigation project.”

We only imagine one set of circumstances in which a commercial mitigation bank could not address the watershed needs as well as an in-lieu fee program. The only way the commercial mitigation banker would have fewer options for selection of locations is if the in-lieu fee sponsor was a government agency exercising powers of eminent domain.

Is this the intent of the statement above? If not, we believe the quoted statement above is erroneous, not consistent with the rationale that was used to support the adoption of the Compensatory Mitigation Rule and should be removed from the Final AEIS.

4. Regarding the discussion of “advance credits” in section 5.5.2.3, the Draft AEIS incorrectly characterizes mitigation banking as follows,

“To address financial considerations that may be important to the development of a mitigation bank, a percentage of the total credits projected for the bank at maturity is regularly authorized for sale once adequate financial assurances are in place to guarantee completion of the mitigation bank site. These *advance credits* also require demonstration of a high likelihood of success (Federal Register, 1995). With a mitigation bank, most permitted impacts are mitigated in advance, with the operational bank being in place at the time of the permit application. However, this would not be the case with *advance credits* authorized to support initial development of a mitigation bank.” (emphasis added)

The citation to the “Federal Guidance for the Establishment, Use and Operation of Mitigation Banks,” which was issued on November 28, 1995 is inappropriate because the 1995 Guidance was superseded by the Compensatory Mitigation Rule issued in 2008. Under the rule in effect today, only in-lieu fee programs receive “advance credits.” Therefore, the discussion of the risks associated with “advance credits” should be properly moved to the discussion of in-lieu fee programs in section 5.5.2.2.

5. Regarding the Draft AEIS’s speculative forecast of the inability of commercial mitigation banks to meet the industry’s need as stated in the following passage from section 5.5.2.3,

“The amount of commercial mitigation bank credits currently available for purchase by potential users within the Peace River and Myakka River watersheds would not exclusively satisfy the mitigation needs of the currently proposed phosphate mines. *It is also unlikely that future commercial mitigation banks that may be developed would exclusively satisfy the mitigation needs of the currently proposed or future mines.* However, the use of commercial mitigation banks in combination with other forms of mitigation (onsite and/or in-lieu fee) could be a feasible approach for the phosphate industry.” (emphasis added)

Given the earliest proposed start date of 2019 (Alternative 4) and the latest proposed end date of 2050 (Alternative 3), we fail to understand why the Draft AEIS states it would be unlikely that commercial mitigation banks would be able to satisfy the needs of industry mitigation. In the 17 years since mitigation banking rules were adopted in Florida, 63 mitigation banks have been approved covering over two-thirds of the State. Our point is simple: Where there is demand for mitigation credits, it is reasonable to assume that supply will be developed to meet the demand, especially given the seven year gap before

start-up and the 30-year duration of mining. We respectfully request that the speculative statement be deleted, and that a realistic appraisal of the market response to demand created by the industry be substituted in its place.

6. Regarding the discussion of single user mitigation banks developed by the industry in section 5.5.2.3, an important consideration is omitted. Commercial mitigation banks offer protection from the liability for mitigation performance. Establishing industry-owned single user mitigation banks would, as the discussion implies, carry all the costs of a commercial mitigation bank, but without the key advantage of liability protection.
7. Regarding the conclusions to the mitigation options discussion in section 5.5.3, we strongly suggest that the conclusions address the hierarchy established in the Compensatory Mitigation Rule and in the U.S. Army Corps of Engineers' Memorandum for Record template used by Jacksonville District permit reviewers. The Draft AEIS discussion does not mention the hierarchy and treats all options equally, when in fact, by rule the options are not on equal footing. The failure to recognize the hierarchy in the Compensatory Mitigation Rule is a misleading omission of material fact that should be corrected in the Final AEIS.
8. Regarding the discussion of non-existent mitigation plans in section 5.6, we believe that the limitation cited for the industry having not submitted mitigation plans (i.e. not yet having approved jurisdictional determinations) must have by now been resolved, and that mitigation plans should be part of the Final AEIS. Given the extent of aquatic resource losses proposed, we believe it is fruitless to evaluate the alternatives without considering concrete plans to compensate for these losses. We respectfully request that the Final AEIS include a discussion of proposed mitigation plans, specifically addressing their consistency with the federal Compensatory Compensation Rule.

Thank you for the hard work and thoughtful analysis that the Draft AEIS portrays. A comment letter such as this necessarily focuses on what we perceive as deficiencies or opportunities to improve the document. On the positive side, we find much to commend the Draft AEIS, but in the interest of time, we refrain from itemizing them. Know, however, that the industry appreciates the work and support of the U.S. Army Corps of Engineers and its cooperating agencies in this endeavor.

Sincerely,
Florida Association of the Mitigation Bankers



Les Alderman
President



Southwest Florida Regional Planning

Comment Source: Margaret Wuerstle,
Southwest Florida Regional Planning Council

www.swfrpc.org
1926 Victoria Avenue
Fort Myers, FL 33901
Phone: (239) 338-2550
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July 31, 2012

Ms. Lauren P. Milligan
Department of Environmental Protection Florida State Clearinghouse
3900 Commonwealth Boulevard, M.S .47
Tallahassee, Florida 323 99-3 000

RE: Department of the Army, Jacksonville District Corps of Engineers – Draft Areawide Environmental Impact Statement (DAEIS) on Phosphate Mining in the Central Florida Phosphate District – Charlotte, DeSoto, Hardee, Hillsborough, Lee, Manatee, Polk and Sarasota Counties, Florida.
SAI # FL201205296249C

Dear Mr. Fellows:

The staff of the Southwest Florida Regional Planning Council reviews various proposals, Notifications of Intent, Pre-applications, permit applications, and Environmental Impact Statements for compliance with regional goals, objectives, and policies, as determined by the Strategic Regional Policy Plan. The staff reviews such items in accordance with the Florida Intergovernmental Coordination and Review Process (Chapter 291-5, F.A.C.), and adopted regional clearinghouse procedures.

These designations determine Council staff procedure in regards to the reviewed project. The four designations are:

Less Than Regionally Significant and Consistent- No further review of the project can be expected from Council.

Less Than Regionally Significant and Inconsistent- Council does not find the project of regional importance, but will note certain concerns as part of its continued monitoring for cumulative impact within the noted goal area.

Regionally Significant and Consistent- Project is of regional importance, and appears to be consistent with Regional goals, objectives, and policies.

Regionally Significant and Inconsistent- Project is of regional importance and does not appear to be consistent with Regional goals, objectives, and policies. Council will oppose the project as submitted, but is willing to participate in any efforts to modify the project to mitigate the concerns.

We have been requested to review the Draft Area-wide Environmental Impact Statement (DAEIS) Phosphate Mining in the Central Florida Phosphate District by the Florida State Clearinghouse.

The SWFRPC has determined that the Draft Areawide Environmental Impact Statement on Phosphate Mining in the Central Florida Phosphate District (DAEIS) is Regionally Significant and Inconsistent in its current form. Specifically, Chapters 4 and 5 are inadequate and preclude meaningful analysis. The SWFRPC requests that the U.S. Army Corps of Engineers (ACOE) prepare and circulate revised drafts of Chapters 4 and 5 for review and comment. Moreover, the SWFRPC recommends that the DAEIS include a recommended action alternative selection based upon the analysis that selects the alternative that has the least impact on the environment and provides the best health, safety and welfare for the people of Florida.

Methodical Treatment of Alternatives,

We question the adequacy of the environmental analysis given that the 25 alternatives are not addressed in a consistent fashion. The alternatives are grouped by "No Action" (1 alternative), "Proposed" (4 alternatives), "Foreseeable" (3 alternatives) and "Potential" (17 alternatives).

We request that each analysis be completed by group on a stepwise basis. No action, then Proposed, then Proposed plus Foreseeable and finally, all alternatives together. It appears that the document is designed for it to be referenced for future mining permitting action particularly since "Foreseeable" mine alternatives include potential mining after the "Proposed" alternatives are completed and into the year 2070.

Discussing the "foreseeable" mines individually avoids discussion of cumulative impacts. In addition, a cumulative analysis could help answer the question of when cumulative impacts would overwhelm the natural resources and degrade the economy of central and southwest Florida.

3.3.1.3 Soil Characteristics of the CGPD (beginning page 3-17)

An overview of soils is provided in Chapter 3 of the DAEIS but no analysis of soils beyond hydric soils for wetland assessment is provided for the alternatives. Chapter 3, page 3-17, states "In the Peace River Basin, the most predominant soil group is A/D with a total cover of 49 percent. Although these are sandy type soils, they are characterized by having high groundwater levels. Soil hydrologic group A covers approximately 18 percent of the Peace River Basin." Given that the most predominant group of soils for the basin are of high and low permeability, changes as a result of phosphate mining may be expected. We request that soil changes as a result of phosphate mining be assessed for the alternatives.

4.4 Groundwater Resources (beginning page 4-63)

We are doubtful of the accuracy of the groundwater resources analysis, comparing the "No Action" to the "Proposed" alternatives. The estimated end of rock production for Wingate Creek and South Pasture Wingate is 2013 and 2025, respectively. Under a "No Action" scenario, the withdrawal for these two mines would cease within the study period (except for a small amount

associated with reclamation activities). Only two "Proposed" mines are analyzed in the DAEIS because South Pasture Extension and Wingate East are expansions of Wingate Creek and South Pasture Wingate and moving the existing Water Use Permits is proposed. If "No Action" occurred, the existing Water Use Permits from Wingate Creek and South Pasture Wingate expire at the end of mining and that water would not be withdrawn. Therefore we request cumulative groundwater modeling comparing the "No Action" and "Proposed" alternatives include reduced mining withdrawals at the appropriate periods.

The DAEIS assesses "Foreseeable" alternatives as if they have no impact because Water Use Permits would be moved from existing and "Proposed" mines and beneficiation plants. If the "Foreseeable" alternatives were not constructed, that water use would not occur. "Foreseeable" alternatives should be compared to "Proposed" mines within the same period (2025 to 2045) and to "No Action." This would compare "Proposed" to "Foreseeable" as alternative scenarios. In addition, we request an analysis adding the "Foreseeable" mine production after "Proposed."

We question the adequacy of the analysis which models only the impacts to the deep Floridan aquifer (FAS) impacts. Groundwater monitoring well data are available for the surficial aquifer, Peace River aquifer, upper/lower Arcadia aquifer and Hawthorn group and these need to be addressed.

Pages 3-59 and 3-60 lists a number of way that phosphate mining can impact the Surficial Aquifer System, including extensive earthwork, dewatering and changed surficial soils, including addition of clay. The section states that the issue is addressed in Chapter 4. However, no analysis of the alternatives relative to these issues is presented in Chapter 4. The DAEIS is internally inconsistent when analyses are promised and not provided. The DAEIS needs to address and analyze Surficial Aquifer System (SAS) impacts of the alternatives.

Analysis relative to the Intermediate Aquifer System (IAS) water levels is limited to Page 3-60 and concludes that "within the Polk County area (the IAS) provide conveyance routes between the SAS and the FAS but such features are less frequently encountered to the south within the Peace River watershed." In the proposed area of mining impact wells are permitted to use the IAS. An analysis of impacts of alternatives to the IAS needs to be conducted.

Tables 4-69 and 4-70 (page 4-227 through 4-230) do not cite maximum drawdown and maximum increase modeled for the alternatives. The tables should include modeled maximum drawdown or increase. In addition, the tables should be ordered so the wells that are most relevant to the analysis are listed first (Upper Peace, SWIMAL, then Ridge Lakes).

Existing wells are not identified in the DAEIS. Water levels and cones of depression (or increase) for each alternative should be compared with the depths of existing permitted wells that intersect those cones of effect. Potentially impacted permitted well should be identified and enumerated for each alternatives.

4.5 Surface Water Resources (beginning page 4-82)

Given that the capture analysis for other alternative mines demonstrates changes, reclamation of existing lands mined and not yet reclaimed (page 4-191) suggests that between 2000 and 2028, acreage of all past and present mines (25,000 acres) will be reclaimed. Given better flows after reclamation is complete within alternatives analysis (e.g. Figure 4-40 on page 4-91), it is reasonable to assume greater flows once capture areas are reclaimed in past and present mines. CHNEP requests that the “No Action” alternative be assessed with reclamation introduced as shown by 2028.

There are questions regarding the adequacy of projected river flows analysis for the alternatives. Each alternative is assessed separately. The “No Action” changes, as described in the preceding paragraph, should be introduced to the “No Mining” comparison for figures 4-37, 4-38, 4-40, 4-41, 4-43, 4-45, 4-46, 4-48, 4-50, and 4-51 (pages 4-88 through 4-102.) The Capture area graphs (Figures 4-36, 4-39, 4-42, 4-44, 4-47 and 4-49) that display cumulative capture areas for the alternatives should be utilized to assist in the cumulative analysis. The cumulative analysis for the alternatives within the Peace River basin should be assessed related to surface water flows at the confluence of the Peace River and Horse Creek.

It is inadequate and inaccurate to only provide an alternatives analysis using average annual rainfall conditions considering average annual flows. Average rainfall conditions and average flow conditions within the year represent a rare condition when ecological resources are under the least amount of stress. The alternatives should assess the cumulative impacts of mines on Peace River, Horse Creek and Big Slough utilizing the 2003 and 2007 hydrographs, when conditions were at more extreme within the period of record (see Figure 4-32 on page 4-83 and Figure 4-33 on page 4-84).

Discussion regarding “Cumulative Impacts to MFLs or MFL Target Water Levels” begins on page 4-220. However, this analysis is limited to Minimum Aquifer Levels (MALs) and does not address the MFLs as outlined in table 3-5 on page 3-49. The Lower Peace River MFL includes a 625 cfs maximum diversion and a low flow threshold of 90cfs. A draft rule is available for the Lower Myakka River and is expected to be submitted to the Southwest Florida Water Management District Governing Board by August. The alternatives should be assessed for the Lower Peace MFLs in a consistent fashion as was assessed for the MALs. The 2003 hydrograph, the median hydrograph, and 2007 hydrograph should be used to assess potential withdrawal impacts by block and for any change to the 90 cfs threshold period. All alternatives need to be quantitatively assessed for MFL.

We question the adequacy of alternatives analysis related to Lower Peace River and Charlotte Harbor salinities. Page 3-45 states that “the AEIS evaluations will ... need to address the potential influence of phosphate mines on river flows in relation to whether any such influences would be of sufficient magnitude to result in ecologically meaningful changes in salinity regimes.” No analyses related to effects on salinity in the Lower Peace or Charlotte Harbor are offered. On page 4-238, one paragraph is offered stating “The net effects of the four proposed new mine projects are not predicted to cause significant cumulative effects on downstream flow regimes and are not likely to impact

Peace and Myakka River discharge volumes sufficiently to impact salinity regimes in the tidal portions of these rivers leading to Charlotte Harbor Estuary.” This statement has no quantitative basis in fact presented in the DAEIS. The mines are assessed separately and not cumulatively. Peace River volume changes are shown at the Arcadia gauge, upstream of most of the “Proposed” and “Foreseeable” mine alternatives. The DAEIS assessment should include changes in salinity, especially the isohalines associated with the oligohaline (0.5 to 5 parts per thousand) and in the context of predicted sea level rise.

4.6 Water Quality (beginning page 4-103)

Chapter 3 (page 3-85) offer links to impairments lists rather than providing them as tables. The first link goes to an EPA search engine. The second link goes to a list of adopted Total Maximum Daily Loads (TMDLs) in Florida. Neither link provides information related to verified impairments in the Peace and Myakka River basins. Impairments within and downstream of the mine alternatives include: Chlorophyll a, dissolved oxygen, fecal coliform, total coliform, iron and mercury. The DEIS should acknowledge existing water quality impairments and potential (numeric nutrient) impairments in the study area and downstream.

Table 4-19 on page 4-109 does not include the Class III Chlorophyll-a criteria. In addition, the table includes only mean values. Table 4-19 should include chlorophyll-a standards and proposed numeric nutrient standards (as identified on page 3-92). The minimums, maximums, and standard deviations should be included in Table 4-19. Pollutant and hydrologic loads and estimated changes in concentrations for each alternative should be presented and analyzed.

4.9 Environmental Justice Review (beginning page 4-150)

The environmental justice (EJ) review screening techniques focus on block group populations of over 50% minority or 20% within poverty intersecting site alternative boundaries. Though that technique is suitable for infrastructure such as roadways to identify potentially affected communities, the impacts of phosphate mining can be as much from changes in employment opportunities as physical proximity. How will hiring practices change as alternative sets move from agriculture to phosphate mining, especially for the working poor? The analysis should include numbers of jobs and education requirements for agriculture versus phosphate production for the entire process including extraction, processing and transport for the mines.

SWFRPC requests that EJ analysis be broadened to address health concerns (including air quality particulate, well water quality, noise, and night lighting) and employment of working poor.

4.11.6 Climate and Sea Level Rise (page 4-165)

The DAEIS devotes eight lines to the climate and sea level rise. The SWFRPC and CHNEP have completed extensive review of climate change vulnerabilities for the project area that can be found at www.chnep.org/CRE.html and http://www.swfrpc.org/climate_change.html. The DAEIS study area of central and south Florida is currently experiencing climate change. The natural setting of southwest Florida coupled with extensive overinvestment in the areas most vulnerable to the effects of climate change have placed the region at the forefront of geographic areas that are among the first to suffer the negative effects of a changing climate. Climate change

is an important social, economic, and community health issue facing our nation and Florida. It is not solely an environmental or scientific issue. The questions and answers surrounding climate change take root in economic, physical, and social structures. The SWFRPC has a two-decade history of addressing climate issues, beginning with its ground-breaking disaster and severe storm preparedness planning. Economic, social, community health, infrastructure and environmental issues have been addressed in the context of storm surge, wind speeds, and infrastructure resilience.

Longer, more severe dry season droughts coupled with shorter duration wet seasons consisting of higher volume precipitation have generated a pattern of drought and flood impacting both natural and man-made ecosystems. Even in the most probable, lowest impact future climate change scenario predictions, the future for central and southwest Florida will include increased climate instability; wetter wet seasons; drier dry seasons; more extreme hot and cold events; increased coastal and riparian erosion; continuous sea level rise; shifts in fauna and flora with reductions in temperate species and expansions of tropical invasive exotics; increasing occurrence of tropical diseases in plants, wildlife and humans; destabilization of aquatic food webs including increased harmful algae blooms; increasing strains upon and costs in infrastructure; and increased uncertainty concerning variable risk assessment with uncertain actuarial futures.

Climate change drivers include air temperature, air chemistry, water temperature and water chemistry. Climate change stressors include changes to rainfall, storm severity, humidity, drought, wildfires, hydrology, salt water intrusion, sea level rise and geomorphic changes. Changes in many of the drivers and stressors of climate change have been measured within and downstream of the CFPD. These include average air temperature, days per year over 90 degrees F, rainfall delivered in the rainy season sea level rise and evapo-transpiration. Much of the DAEIS analysis relates to these changing conditions that will be exacerbated by climate change factors. However, past conditions are applied throughout the analysis. Section 4.11.6 is the opportunity to suggest changing condition adjustments to consideration of alternatives.

For example, over the past 100 years, 6 percent of annual rainfall has moved from the dry season to the rainy season, creating wetter rainy seasons and drier dry seasons. Drops in river flow contributions exacerbate the effects of sea level rise by increasing salinities, moving aquatic species up the system. This may put the DeSoto County bulrush marshes and Peace River/Manasota Water Supply Authority intake at risk.

SWFRPC requests a methodical assessment of how each driver and stressor is exacerbated or ameliorated by the phosphate mining and processing alternatives.

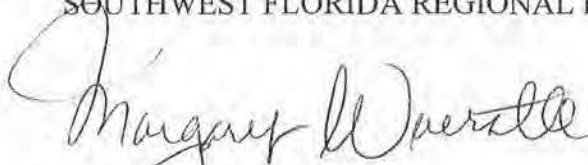
5. Mitigation (beginning page 5-1)

Chapter 5: Mitigation of the DAEIS is inadequate and incomplete. Chapter 5 should include a presentation of avoidance and minimization techniques for all of the alternatives. This would include protecting existing stream riparian systems and restoring stream courses ditched for agriculture. The wide array of avoidance and minimization techniques employed through modern phosphate mining permits and through best management practices should be presented in detail, by each of the primary issues of concern identified in the executive summary, page 3.

The mitigation for the alternatives should follow the federal sequencing of Avoidance, Minimization, Adaptation, and then Mitigation (AMMA). Going directly to mitigation short circuits principles of good project design and proper conservation stewardship.

Thank you for the opportunity to participate in the development and review of the DAEIS. If you have specific questions about the content of this letter, please contact Mr. Jim Beever directly at (239) 33802550 ext 224, e-mail jbeever@swfrpc.org.

Sincerely,
SOUTHWEST FLORIDA REGIONAL PLANNING COUNCIL



Margaret Wuerstle, AICP
Executive Director

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July 31, 2012
Page 8 of 8

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Fort Myers, FL 33919

3PR REVIEW COMMENTS:
Draft Area-Wide Environmental Impact Statement
On Phosphate Mining In The
Central Florida Phosphate District
US Army Corps of Engineers, Jacksonville District, May 2012

Re: Draft Area-Wide Environmental Impact Statement
On Phosphate Mining In The Central Florida Phosphate District

Submitted By: People for Protecting Peace River, Inc.
4224 Solomon Rd
Ona, FL 33865

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INTRODUCTION

The "Substantive Comments" contained herein are prepared and submitted by the People for Protecting Peace River, Inc. (3PR), a Florida non-profit organization. They are provided in response to the document entitled "Draft Area-Wide Environmental Impact Statement on Phosphate Mining in the Central Florida Phosphate District" (DAEIS) issued by the US Army Corps of Engineers (USCOE), Jacksonville District, May 2012". 3PR has been an active and public participant in phosphate mining/planning/permitting issues and is interested in all environmental concerns which have the potential to affect west Central Florida.

The DAEIS was prepared by the US Army Corps of Engineers, Jacksonville District. It is required to have been prepared based on, and consistent with, the policies, regulations, and public laws of the United States including, but not limited to, The National Environmental Policy Act (NEPA), hereafter referred to as the "Act" or "NEPA", and 40 CFR, which is administered by the United States Environmental Protection Agency (USEPA).

The Congress of the United States has declared as a "National Policy", "*to promote efforts which will prevent or eliminate damage to the environment and biosphere*":

42 USC § 4321 - Congressional declaration of purpose

*The purposes of this chapter are: To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will **prevent or eliminate damage to the environment and biosphere** and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality.*

47 Additionally, "Congress recognized that nearly all federal activities affect the environment in some
48 way and mandated that before federal agencies make decisions, they must consider the effects of their actions
49 on the quality of the human environment"¹.

50 The specific purpose and mandate of NEPA, "**as our basic national charter**", is "**Protection of the**
51 **Environment**" through actions which "protect, restore, and enhance the environment", through "accurate
52 scientific analysis" and "decisions that are based on understanding of environmental consequences", without
53 including "needless detail". Its provisions require that the information upon which decisions are made must be
54 of "high quality". The Act also stresses that "expert agency comments and public scrutiny are essential".

55 40 CFR 1500.1 Purpose

56 (a) The National Environmental Policy Act (NEPA) is our basic national charter for
57 **protection of the environment**. It establishes policy, sets goals (section 101), and provides
58 means (section 102) for carrying out the policy.

59 (b) NEPA procedures must insure that environmental information is available to public
60 officials and citizens before decisions are made and before actions are taken. The
61 information must be of high quality. **Accurate scientific analysis, expert agency comments,**
62 **and public scrutiny are essential to implementing NEPA.** Most important, NEPA
63 documents must concentrate on the issues that are truly significant to the action in
64 question, rather than amassing needless detail.

65 (c) Ultimately, of course, it is not better documents but better decisions that count. NEPA's
66 purpose is not to generate paperwork--even excellent paperwork--but to foster excellent
67 action. **The NEPA process is intended to help public officials make decisions that are**
68 **based on understanding of environmental consequences, and take actions that protect,**
69 **restore, and enhance the environment.**

70 40 CFR 1500.3 Mandate

71 Parts 1500 through 1508 of this title provide regulations applicable to and binding on all
72 Federal agencies for implementing the procedural provisions of the National
73 Environmental Policy Act
74

75 In preparing its substantive comments for the DAEIS, 3PR is relying on adherence to the Act and other
76 relevant federal laws by all federal agencies.

77 3PR is questioning the information and analysis contained in the DAEIS in terms of its accuracy and
78 adequacy, and is doing so by presenting its assertions with sound and reasonable basis. As cited below, 40 CFR
79 provides that the comments may address the adequacy of the DAEIS and merits of the alternatives, and that the
80 agency will assess, consider, and respond to all comments:

81 40 CFR 1503.3 Specificity of Comments

82 (a) Comments on an environmental impact statement or on a proposed action shall be as
83 specific as possible and may address either the adequacy of the statement or the merits of
84 the alternatives discussed or both.

85
86 40 CFR 1503.4: Response to Comments

87 (a) An agency preparing a final environmental impact statement shall assess and consider
88 comments both individually and collectively, and shall respond by one or more of the
89 means listed below, stating its response in the final statement. Possible responses are to:

- 90 • Modify alternatives including the proposed action.
- 91 • Develop and evaluate alternatives not previously given serious consideration by
- 92 the agency.
- 93 • Supplement, improve, or modify its analyses.

¹ Executive Office of the President of the United States: <http://ceq.hss.doe.gov/>

- *Make factual corrections.*
- *Explain why the comments do not warrant further agency response, citing the sources, authorities, or reasons which support the agency's position and, if appropriate, indicate those circumstances which would trigger agency reappraisal or further response.*

The legal purposes of an Environmental Impact Statement include, but are not limited to, assuring a "full and fair discussion of significant environmental impacts", and development of reasonable alternatives which avoid or minimize adverse impacts. It is required to be "concise, clear, and to the point", and "supported by evidence that the agency has made the necessary environmental analyses":

40 CFR 1502: "Environmental Impact Statement"

1502.1: Purpose - The primary purpose of an environmental impact statement is to serve as an action-forcing device to insure that the policies and goals defined in the Act are infused into the ongoing programs and actions of the Federal Government. It shall **provide full and fair discussion of significant environmental impacts and shall inform decision makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment.** Agencies shall focus on significant environmental issues and alternatives and shall reduce paperwork and the accumulation of extraneous background data. Statements shall be concise, clear, and to the point, and shall be supported by evidence that the agency has made the necessary environmental analyses. An environmental impact statement is more than a disclosure document. It shall be used by Federal officials in conjunction with other relevant material to plan actions and make decisions.

3PR GENERAL POSITION STATEMENT

* Substantive Comment:

3PR presents its comments as respectfully as is morally possible. In our comments we have strived for objectivity and sincerity. Even so, it is "truth", "transparency", and "compliance" in federal permitting that we wish to further. We fully anticipate forthright, sober evaluations and replies to our comments.

In the sections which follow, 3PR supports with sound and legal and scientific basis that the information provided in the DAEIS is generally inadequate and inaccurate for its intended purposes of "**Protection of the Environment**". 3PR considers that many statements and portions of the DAEIS consists merely of large volumes of *pro forma* data and cookie-cutter analyses which do not further the "**understanding of environmental consequences, and take actions that protect, restore, and enhance the environment**" as required by NEPA.

In general, 3PR contends that the environmental analysis is so highly inadequate, inaccurate, and in many instances misleading that the DAEIS should be completely rejected in favor of the development of a new, more objective, complete, reasonable, clear and concise document which provides the meaningful and measurable directives needed to protect west-central Florida from the diverse negative impacts associated with phosphate strip mining.

INAPPROPRIATE AEIS SCOPE

* Substantive Comment:

3PR objects to the narrow and short-sighted view of the DAEIS, because its narratives nowhere express proper concern for the scale and intensity of mining impacts, the diversity of impacts, or especially the inestimable cumulative impacts and legacy of environmental disaster which phosphate strip mining has bequeathed west-central Florida.

The DAEIS purports to include an "affected area" or "study area" designated as the Central Florida Phosphate District (CFPD)[which is actually the FDEP 'Conceptual Mineable Limit'] (Figure 1) which encompasses approximately 1.32 million acres of land (actually closer to 1.35 million acres), and which physically extends through parts of six counties. It is obvious that phosphate strip mining within the CFPD will not only profoundly affect the landscape of west-central Florida, but that the negative effects of mining will extend far outside of this artificial boundary, especially impacting "downstream" jurisdictions including Charlotte, Lee and Sarasota counties.

The boundary of the CFPD represents merely the mineable limit, that is, the extent to which the phosphate industry eventually will mine, or the currently economically feasible phosphate strip mining limit. However, an Environmental Impact Statement must include all regions and all types of potential "impact", including environmental impacts, economic impacts, and impacts to human society. For this reason, a much broader study area is needed. The study area should include the mineable limit plus a broad buffer extending downstream along the four affected major rivers (and Horse Creek) to, and including, the receiving bays and estuaries. Such a study area would then "truly" represent the "affected area" which will most certainly be negatively impacted by phosphate strip mining.

The four phosphate strip mining approvals would, if permitted to do so, result in mining which would extend over decades, transcending politics, political terms, and changes in socioeconomic patterns. Post-mining scenarios will require the perpetual maintenance and management of inestimable liabilities such as CSAs, pollution spills, and various forms of other contamination. The negative economic of environmentally damaging industries "*are generally hidden from traditional economic accounting*" (Daily 1997). Eventually future generations which had no role in the permitting process, and which did not share in any of the short-term economic benefits, such as the very slight increases in jobs for local residents, will inherit the sad environmental and economic legacy left by phosphate strip mining. That is, the counties actually being sacrificed for mining will not share significantly in its huge profits.

DAEIS AVOIDS NEPA PURPOSE

* Substantive Comment:

3PR considers that the DAEIS is substantially incomplete because it appears to center its attentions on Section 404 (CWA) Dredge and Fill permitting as though the vast and controversial phosphate strip mining proposals were merely small, necessary, business or residential projects with no significant environmental impacts, and as though wetland permitting were the only "real" issue. Nowhere does the DAEIS provide sufficient data, analysis, and direction commensurate and consistent with fulfilling NEPA's purpose of

173 **"Protection of the Environment"** in preparing and administering **"Environmental Impact Statements"**.
174 Incredibly, Alternative-1 ("No-Action") does not appear to restrict or prohibit continued mining in uplands and
175 upland ecosystems, which is where the most profound and irreparable impacts of phosphate strip mining take
176 place. Such mining "strips" away the landscape, then "mines" the earth (matrix) below it. It appears that the
177 DAEIS allows, even with "no permit", that the most significant and devastating of all aspects of phosphate strip
178 mining will still be allowed to take place. The direct impacts include, but are not limited to: near total
179 topographic alteration of the landscapes of entire regions, regional wide destruction of aquifers, vast and
180 extensive alteration of recharge systems, area-wide reconfiguration of the surface-water runoff patterns of
181 rivers, creeks, and seepage regimes, and area-wide changes to the average evapotranspiration rate.

182 The totality of upland transfiguration and ecosystem destruction will also have profound negative
183 impacts to water quality and quantity. In fact, the DAEIS cites that phosphate strip mining in uplands will
184 result in excavation of pits and pumping, potential reductions in water table elevations of "20 feet", and direct
185 impacts to the surficial aquifer system (SAS), hydrology and sensitive habitats, groundwater dewatering,
186 impacts to shallow wells, lowering of local water tables, and further extensive alterations to surface water
187 management systems by ditching and construction of clay waste disposal (CSAs) sites including dams and
188 berms. Acknowledgement or analysis of the relationship of the specialized vegetative communities which
189 occur in the Southwestern Florida Flatwoods Ecoregion (Figure 4) and their high degree of correlation to
190 regionally specific and unique soils is conspicuously absent throughout the DAEIS. Possibly it is inconvenient
191 to discuss the destruction of ecological resources which can never be restored or replaced.

192 NEPA requires coordination with state and local agencies and consistency with their laws,
193 regulations, and planning. *"The AEIS study area is located within a water supply planning area that SWFWMD*
194 *has defined as the Southern Water Use Caution Area (SWUCA) on the basis of concerns that cumulative*
195 *reliance on withdrawals from the upper FAS through well systems to meet potable, agricultural, and industrial*
196 *water supply demands has resulted in an unsustainable lowering of the potentiometric surface of the Floridan*
197 *aquifer."* The DAEIS acknowledges SWUCA, discusses SWUCA, then fails to appropriately consider the
198 tremendous magnitude of the negative water resource impacts potentially threatening the "Water Use Caution
199 Area" by area-wide phosphate strip mining, most of which takes place in uplands, yet the impacts of which
200 absolutely and profoundly affect river flows, aquifers, and wetlands.

201 Natural systems are composed of the interrelated and inseparable factors of physical/geologic,
202 hydrologic, atmospheric/climatic, and biotic. Damage to one creates damage to the others. Phosphate strip
203 mining has a long history of obliterating these life-giving assets and precluding their natural recovery.

204 A Florida Administrative Law Judge recently found that *"Modern (phosphate) mining still has a*
205 *devastating impact on the local natural environment."* (J. Lawrence Johnston 2003).

207 DAEIS VOLUMINOUS - LACKING "REAL" INFORMATION

208 * Substantive Comment:

209 The DAEIS is insufficient and/or unsupported by independently developed, regionally relevant data
210 and proper site-specific evaluations and research. Most sections are highly deficient and preclude meaningful

review and comment. The content of the DAEIS appears to rely disproportionately on representations, data, and analyses obtained from the Applicants and/or other sources directly or indirectly related to the phosphate strip mining industry, such as The Phosphate Council. These interactions may be procedurally "technically" permissible? However, they greatly tarnish transparency in the NEPA process, and serve to erode the credibility of the DAEIS. Voluminous information, data, and analysis are provided in the DAEIS. However, in large part, the quality, appropriateness, and relevancy of the information are perceived by 3PR as grossly unacceptable. It appears that the DAEIS includes precisely the types and bulk of content that NEPA specifically warns not to include or indulge in: "***Agencies shall focus on significant environmental issues and alternatives and shall reduce paperwork and the accumulation of extraneous background data. Statements shall be concise, clear, and to the point, and shall be supported by evidence that the agency has made the necessary environmental analyses***". These points are more particularly described in later sections below.

DAEIS PROMOTES APPLICANTS NEEDS AND VIEWPOINTS

* Substantive Comment:

3PR questions and contends that the DAEIS promotes many positions for which there is intense and adamant disagreement among scientists and researchers who are "independent" of the phosphate industry, and its related agencies, consultants, attorneys and public relations personnel. Many of these disagreements have to do with the tremendous extent of wetlands, upland native ecosystems, and native biota historically destroyed by phosphate strip mining, and the fact that many of these systems can never, and have not, been replicated, replaced, or effectively restored to any reasonably viable or functional ecological systems, and that the native assets involved are essential to protect in trust for the future of humanity.

The DAEIS almost completely omits and avoids the tremendous body of scientific literature and research data and analyses which show the negative impacts which phosphate strip mining and its related industries have imparted to native upland and wetlands ecosystems and biota, rivers, streams, estuaries and other aquatic resources, groundwater resources, surface water resources, aquifers, water quality, availability, and distribution, climate, community planning, and public health and safety, and many other areas of concern to the environment and the human population which depends upon it.

DAEIS IGNORES THE PROTECTION OF ECOSYSTEMS

* Substantive Comment:

3PR questions the adequacy of the environmental analysis and the accuracy of information in the DAEIS, because it fails to consider the extremely important role of native ecosystems, especially native upland ecosystems as repositories of ecological diversity, in maintaining climate, in sequestering carbon, in providing for native wildlife, including plants and animals, providing aesthetics and a healthy human environment, and many other benefits essential to humans and the environment. Also ignored are the irreplaceable values of native soils in maintaining water quality, regulating hydrology, ameliorating the climate, and supporting regionally adapted vegetation associations and unique gene pools.

Upon examination of the DAEIS it occurs to 3PR that there are some who do not know what an "Ecosystem" represents:

An ecosystem is a community of animals and plants interacting with one another and with their physical environment. Ecosystems include physical and chemical components, such as soils, water, and nutrients that support the organisms living within them. These organisms may range from large animals and plants to microscopic bacteria. Ecosystems can be thought of as the interaction among all organisms in a given habitat. People are part of ecosystems. The health and well-being of human populations depends upon intact and carefully managed ecosystems and their components - organisms, soil, water, and nutrients.

²

Ecosystems and Biodiversity provide "services" that:

- Moderate weather extremes and their impacts.
- Disperse seeds
- Mitigate drought and floods.
- Protect people from the sun's harmful ultraviolet rays.
- Cycle and move nutrients.
- Protect stream and river channels and coastal shores from erosion
- Detoxify and decompose wastes.
- Control the vast majority of agricultural pests.
- Maintain biodiversity.
- Generate and preserve soils and renew their fertility.
- Partially stabilize climate.
- Purify the air and water.
- Partially stabilize climate.
- Regulate disease carrying organisms.
- Pollinate crops and natural vegetation. (Daily et al 1997).

The recognition of the value of ecosystems and the natural environment is conspicuously absent, virtually omitted from much of the DAEIS. 3PR therefore expounds on this primary issue throughout its comments. *"It is the web of life which supports humanity"*; a fact which is fatally ignored throughout the DAEIS.

SCOPING PROCESS BIASED AND RESTRICTIVE

* Substantive Comment:

3PR questions the adequacy of the scoping process for the DAEIS, because it did not sufficiently include involvement of well-known research institutions, regional ecologists, and sources of credible research, especially Archbold Biological Station (preeminent research center for conservation biology, plant ecology and restoration biology in central Florida), the Natural Resources Flight of the Avon Park Air Force Range (conducting federal research for large-scale ecosystem conservation land management involving many listed plants and animals native to central Florida), Center for Plant Conservation Network at Bok Tower Gardens (conducting extensive research relating to listed/endemic native plant relocations, reintroduction strategies, and endemic plant ecology), Tall Timbers (ecological, botanical, management, and forests research) and other

² U.S Dept. of the Int., U.S. Geol. Sur. Understanding Ecosystems and Predicting Ecosystem Change.

central Florida biologists who have conducted independent ecosystems studies. Neither has their relevant published research been cited or considered.

3PR questions the adequacy of the scoping process for the DAEIS, because important relevant ecosystem research and analyses, as discussed and cited elsewhere herein, were not independently formulated and conducted specific to the ecosystems, environs, and biota found within the CFPD, particularly within the southern half of this area. Because of the immense size of the CFPD, and the intensity and indelibility of phosphate strip mining impacts, independent, objectively verifiable studies should have been conducted so that the immediate impacts, as well as the cumulative impacts of mining could be properly evaluated. However, this was not the case, as much of the important information which should have been "*objective*", and subjected to the "*public scrutiny*" as NEPA requires, appears merely to have been provided by the Applicants, their agents, or phosphate strip mining proponents.

3PR questions the adequacy of the scoping process for the DAEIS in terms of "*Environmental Justice*", because low-income and minorities may not have been well represented and accorded fair treatment and meaningful involvement, and because the Applicants appear to have been overrepresented throughout the process, including interactions relating to the development of the DAEIS. As previously indicated, the latter may be permissible under the Act, but tremendously and untenably biases the DAEIS.

3PR SCOPING PROCESS OBJECTION

* Substantive OBJECTION:

3PR vehemently objects to the scoping process as providing any legitimate bases for the development of the AEIS under NEPA, because the data and analyses, recommendations, and opinions of independent scientists and environmental professionals were not properly considered or incorporated.

3PR provided the results of qualified site specific environmental studies, which were summarily rejected without comment or explanation. 3PR provided these environmental analyses through its professional consultants, Winchester Environmental Associates, Inc. Several important primary concerns relating to phosphate strip mining were evaluated through on-site and offsite environmental analyses, including wetlands mitigation, wetland reclamation, endangered species, cumulative impacts, and downstream estuarine concerns. The lead scientist for this exercise is one the most experienced professional consultants in the region, and has qualified as an expert witness and testified in legal proceedings many times.

Resistance to independent scientific information appears to be endemic to phosphate strip mine permitting procedures. However, such rejection of public involvement is diametrically inconsistent with the spirit and intent of NEPA and the public participation and involvement requirements guaranteed under the Act. Moreover, NEPA stresses that public scrutiny is essential to its fair implementation and sole mission of "*Protection of the Environment*". NEPA requires that agencies encourage participation at all levels and requests involvement and comments from the public, affirmatively soliciting comments from those persons or organizations which may be interested or affected.

If important site-specific relevant research and information provided directly by the highly experienced and reputable representative of a prominent local professional consulting firm is not welcomed by the USCOE, then it is clear that no independent voices were to be considered in the scoping process.

This single example is emblematic of the dreadful deficiencies of the scoping process and insincere efforts to claim public involvement and objectivity. This incident solidifies the appearance evident throughout the scoping process of near total reliance on information and representations provided by the Applicants and pro-mining interests.

PUBLIC INVOLVEMENT LACKING

* Substantive Comment:

3PR questions the adequacy of the measures taken in the DAEIS to assure appropriate levels of public involvement and participation, especially fair treatment and meaningful involvement of low-income and minority (non-English speaking) segments of local communities, which are prevalent in many areas of the CFPD, especially in rural jurisdictions such as Hardee County, an impoverished area, and DeSoto County, the poorest county in Florida.. Such socially and economically disadvantaged residents represent special cases of concern. They are deserving of the additional efforts needed to effectively involve and educate them concerning AEIS process, and concerning the myriad of potential negative impacts phosphate strip mining will ultimately have on their lives, livelihoods, and futures. They are also entitled to other supplementary and ancillary considerations which are necessary in order achieve "*Environmental Justice*".

"ENVIRONMENT JUSTICE" NEEDED FOR MINORITIES AND LOW-INCOME

* Substantive Comment:

3PR questions the adequacy of the environmental analyses and accuracy of the information in the DAEIS, because the "Environmental Justice Review" is inappropriate and not without bias, and because the processes involved in the review were not open and transparent to low-income and minority communities. 3PR also contends that low-income and minority communities may not have been appropriately informed, in accordance to their special needs, and as to the potential negative impacts which continued phosphate strip mining may have on their communities.

Definition of "Environmental Justice" (EPA's Office of Environmental Justice): "*The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.*"

It is stated in the DAEIS that "*Consistent with EO 12898, this Draft AEIS incorporates by reference the studies conducted by the Applicants on socioeconomic conditions in the CFPD*". Firstly 3PR cannot determine the meaning of "incorporate by reference" in this context because none document(s) of the "Applicants" was/were referenced in this section or elsewhere in the DAEIS (as far as 3PR can determine).

Clearly, it is not appropriate, or in the best interests of minority and low-income populations for phosphate strip mining Applicants to determine their special needs or purport to administer environmental justice. The previously cited statement shows a clear conflict of interests in that the Applicants were allowed to provide data and analyses, and draw conclusions which have the potential to profoundly and negatively affect public welfare in regard to "*Protection of the Environment*" which is the purpose of NEPA. Executive Order 12898 is a presidential order directing the federal government, and all federal agencies, to investigate the environmental impacts of federal action on the lives, communities, and economies of "*minority populations and low-income populations*". Also, there is no mention in the Executive Order of addressing these concerns at the census block level as the DAEIS suggests. Quite to the contrary, the Presidential Memorandum that accompanied the Executive Order speaks only about communities and specifically cautions that minority and low-income "communities" may be missed and that "distortion" may occur by using census data (USEPA 1997).

The fact that census data can only be disaggregated to certain prescribed levels (e.g., census tracts, census blocks) suggests that pockets of minority or low-income communities, including those that may be experiencing disproportionately high and adverse effects, may be missed in a traditional census tract-based analysis. Additional caution is called for in using census data due to the possibility of distortion of population breakdowns, particularly in areas of high Hispanic or Native American populations. In addition to identifying the proportion of the population of individual census tracts that are composed of minority individuals, analysts should attempt to identify whether high concentration "pockets" of minority populations are evidenced in specific geographic areas.

Four specific actions were directed at NEPA-related activities, including:

- 1. Each federal agency must analyze environmental effects, including human health, economic, and social effects, of federal actions, including effects on minority communities and low-income communities, when such analysis is required by NEPA.*
- 2. Mitigation measures outlined or analyzed in EAs, EISs, or Records of Decision (RODs), whenever feasible, should address significant and adverse environmental effects of proposed federal actions on minority communities and low-income communities.*
- 3. Each federal agency must provide opportunities for community input in the NEPA process, including identifying potential effects and mitigation measures in consultation with affected communities and improving accessibility of public meetings, official documents, and notices to affected communities.*
- 4. In reviewing other agencies' proposed actions under Section 309 of the CAA, EPA must ensure that the agencies have fully analyzed environmental effects on minority communities and low-income communities, including human health, social, and economic effects.*

Executive Order 12898 requires federal actions to address environmental justice in minority populations and low-income populations. The DAEIS does not consider the mandates of Environmental Justice in its deliberation, analyses, conclusions, and recommendations.

Executive Order 12898 of February 11, 1994

Section 1-1. Implementation.

1-101. Agency Responsibilities. To the greatest extent practicable and permitted by law, and consistent with the principles set forth in the report on the National Performance Review, each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions, the District of Columbia, the Commonwealth of Puerto Rico, and the Commonwealth of the Mariana Islands.

Of the six counties intersecting the CFPD, and the three "downstream" counties which are also greatly affected (Charlotte, Lee and Sarasota counties), Hardee and Desoto are the most impoverished, and support the highest percentages of minorities. 2011 US Census Bureau estimates that 44.5% of the population of DeSoto County belongs to minority classes, and that the per capita income in (2010 dollars) is only \$15,989. 26.9% of persons (nearly double the national average of 13.9%) are below the poverty level³. 52.4% of the population of Hardee County is estimated to belong to a minority. The per capita income is a mere \$14,668, with about 26.1% of persons (nearly double the national average of 13.9%) existing below the poverty level⁴. These two counties are entitled to additional protection under the following federal action to address Environmental Justice in Minority Populations and Low-Income Populations. In addition, it has been demonstrated, and documented, that immigrant minorities often intentionally avoid being counted by the Census, or by government. It is therefore very likely that the "actual" minority and low-income statistics for Hardee and DeSoto counties may be even more dismal than officially reported. In any case, it is certain that wide-spread destruction of native agriculture soils and potential farmlands, some of which have been in production for decades, and extensive alterations of topography and water resources, will negatively impact these rural communities whose residents traditionally derive their livelihoods from local agriculture, historically the dominant industry of the region. Hardee and DeSoto counties rely almost totally on natural resources, in the form of agriculture, as an economic base. Many decades are required to build the infrastructure necessary to sustain such agriculture as citrus farming, truck (vegetable) farming, berry farming, cattle ranching, and others. Area-wide phosphate strip mining is an exploitive, short-sighted industry, out for huge profits at the expense of lands, traditions, and communities. Mining erodes agricultural infrastructure and the rural way of life by temporarily moving part of the economy to an industry which merely passes through, destroying agricultural land as it goes, and leaving perpetual community liabilities in its wake. Some agricultural lands recently mined have been in continuous agricultural production for nearly 100 years. The traditional way of life and futures of Hardee and DeSoto counties are thus threatened by mining.

When communities become reliant on a polluting and environmentally destructive industry for jobs and tax revenues, local governments become reluctant to take actions which would avoid risks to health and the environment that cost the industry money. In this scenario, minority and low-income communities usually do not enjoy other benefits in proportion to the health risks and economic impacts they bear.

Although a great body of science exists which provides technologies which enable efficient, profitable, and safe farming in areas supported by native soils, much less is known concerning the unnatural rocky/marl/sand/clay/etc (Arents-Hydraquents-Neilhurst) substrates resulting from phosphate strip mining. Table 1 suggests that 7,241 acres of dam-enclosed waste clay facilities (CSAs) would result from a previously proposed mine at Ona as analyzed by Hazen & Sawyer (2003), and that the vast majority of native soils would be transformed to post-mine substrates. The CH2M-Hill economic analysis in the DAEIS and the BOCC Ona Mine economic study (Hazen & Sawyer 2003) prepared by the Hardee County Board of County Commissioners, indicate that only a small number of temporary jobs will be created as the phosphate industry

³ US Census Bureau, "Quick Facts", DeSoto County, FL: <http://quickfacts.census.gov/qfd/states/12/12027.html>

⁴ US Census Bureau, "Quick Facts", Hardee County, FL: <http://quickfacts.census.gov/qfd/states/12/12049.html>

mines its way through the southern counties (mainly Hardee, DeSoto, and Manatee). "On average, there will be about 73 more jobs in the county each year than would exist without mining on the Ona Property" Additionally, the Hazen & Sawyer study did not consider the positive economic impacts and social values provided by non-game wildlife, safe commercial outdoor recreation, and environmental/wilderness aesthetics which benefit Hardee County, and which if further developed, could very greatly benefit the county and quality of life in the county, in perpetuity, as self-sustaining assets (FFWCC 2003). Additionally, the study did not fully investigate all aspects of the potential for increased residential and commercial development which include ranges of land uses infinitely less damaging than phosphate strip mining. The impacts of this single project (Ona) has the potential to negatively affect local communities and the environment on a large scale, and especially to reduce job opportunities for members of low-income and minority communities which traditionally rely on viable agriculture for the livelihoods in this region of Florida, and which, unfortunately, generally have much lower educational attainment than whites and certain other segments of society.

Table 1

Land Use on the Ona Property by Scenario (Acres)

Scenario	Year					
	1	10	20	30	40	50
Mine						
Mined This Year	320	800	800	0	0	0
Mined Out - Unreclaimed	0	1,084	854	0	0	0
Reclaimed Areas						
Natural Systems / CSAs (CSAs total 6,269 acres)	0	1,284	5,844	7,241	7,241	7,241
Agriculture – Cow-Calf	0	992	4,662	8,595	8,595	8,595
Agricultural Uses On Land Not Yet Mined						
Improved Pasture	7,314	3,474	306	306	306	306
Wooded Pasture	637	637	269	269	269	269
Other	146	146	114	27	27	27
Rangeland	3,053	3,053	524	524	524	524
Natural Areas	9,164	9,164	7,288	3,713	3,713	3,713
Residential and Related Infrastructure	41	41	15	1	1	1
Total	20,675	20,675	20,675	20,675	20,675	20,675
Phosphate Production (Tons)	1,613,440	4,033,600	4,033,600	0	0	0

(Source: Hazen & Sawyer, 2003)

3PR additionally questions the adequacy of the environmental analyses in the DAEIS, because independent, site-specific research (Hazen & Sawyer 2003) indicates that mining will be at the expense of viable agriculture, long-term economic growth, future development, and protection of the environment, water resources, and public health. Minorities and low-income residents are invested in their communities the same as other classes. No matter where they live in a jurisdiction (county) their lives will be negatively affected by phosphate strip mining. The economic profits of mining can never compensate for ecosystem destruction, or repair the damage to soils, aquifers, and geology. Only a small fraction of the residents of Hardee and DeSoto are employed by mining, the vast majority of profits of which benefit external destinations and entities. To allow phosphate strip mining to move through a county, or in this case an entire region, leaving a wasteland in its wake, is not Environmental Justice. In the case of Hardee County, and as explained previously, such far-

reaching and diverse impacts as associated with phosphate strip mining will disproportionately affect minorities and those of low-income.

The majority of residents living within the southern half of the CFPD, mostly Hardee and DeSoto counties, either do not have a computer with Internet service, or do not have adequate Internet performance to effectively acquire and manage the documents involved. Not that they would actually be in a position to evaluate them. Disproportionately, the residents of these impoverished, less educated, mainly agricultural-based, strikingly lower socioeconomic jurisdictions, are much less able to become aware or acquire notice of federal actions, to analyze and understand the consequences of such actions, or effectively respond or comment. In many cases these residents do not possess an adequate level of education to comprehend the significance of the proposed action. This neglect is compounded by the fact that little or no effort has been made to specifically ensure that these special classes have been made aware of the scope, level of impacts, and long-term implications and consequences of the proposed, extensive, phosphate strip mining. In addition large percentages of these populations are minority classes, mainly Hispanic. Significant portions of the populations of Hardee and DeSoto counties do not read or speak English, or only marginally understand, read, or speak English as a second language. An exclusion of minorities, poorer classes of people, and less educated people has occurred through lack of consideration of their special circumstances in the development of the DAEIS, and in phosphate strip mining matters in general. This is evidenced by their lack of participation proportionate to their population shares in DeSoto and Hardee counties. The minority classes in particular are not represented, or are poorly represented in local politics and government. Many do not hold jobs with industries that will pay them to attend public meetings, such as the phosphate industry. Such matters represent class discrimination based on national origin, race/color, and education, and are important "Environmental Justice" concerns not considered in the development of the DAEIS, or in the large permit applications currently being considered for approval which are intrinsically the subject and current focus of this federal action.

Because the minority and low-income classes, particularly those of Hispanic origin, represent the fastest growing segment of the populations of Hardee and DeSoto counties. Hispanic people will soon become heir to these counties, both socially and politically. Sadly, they are also destined to inherit the extreme liabilities and other negative legacies of area-wide phosphate strip mining. These generally include, but are not limited to, extensive clay waste facilities, wholesale ecosystem and wildlife habitat destruction, degradation and alteration of wetlands, creeks, streams, and water resources, elevated radiation levels, and pollution and spills of various types from various sources. The DAEIS is inadequate and inaccurate in that it does not specifically provide planning considerations for this social change, or social phenomenon, in consideration of the community impacts and economic shifts associated with phosphate strip mining.

As previously indicated, many extreme environmental impacts, and many crucial environmental issues are directly involved in large-scale phosphate strip mining and its related industries. Much has been reported and published concerning the negative effects of such mining on minorities and low-income residents, and on their impoverished communities.

Unfortunately, because of the completely inadequate amount of time provided by the USCOE/USEPA to obtain and comment on the contents of a 1,063 page report, 3PR can only respond on a few issues. Because

an insufficient amount of time was allotted for review and comment, this too is inconsistent with ensuring "Environmental Justice". It is not merely a deficiency in providing for the special rights of the low-income residents, impoverished communities, and minorities, which are guaranteed through special consideration, but communication of important issues and concerns, which in such communities requires a significant special effort because such citizens have less education, financial means, time, and lack access to the technical resources needed to read, verify, and comment on such a voluminous and technically specialized document as the DAEIS.

Of additional significance and concern with the abbreviated comment period allotted the DAEIS, is that the document contains a large number of very complex and technical alternatives, each of which would independently require substantial time and resources to evaluate. Even to verify and comment on a single significant issue, such as hydrologic impacts, may require months. The DAEIS is thus further inadequate and deficient in that it contains a highly excessive amount of technical information. This is discussed further later, but in essence, the DAEIS does not only treat the geographic area involved as a single area-wide project, but includes many renditions of multiple subprojects, which must each be analyzed separately.

Lisa F. Garcia, senior adviser to the EPA administrator for environmental justice, emphasized the importance of advancing environmental justice and the goals of Plan EJ 2014, *"Far too often, and for far too long, low-income, minority and tribal communities have lived in the shadows of some of the worst pollution, holding back progress in the places where they raise their families and grow their businesses. Today's release of Plan EJ 2014 underscores Jackson's ongoing commitment to ensuring that all communities have access to clean air, water and land, and that all Americans have a voice in this environmental conversation."*

The DAEIS is therefore inadequate and requires reconsideration of all environmental issues, and introduction and of additional/new environmental data, analyses, and issues relevant to the well-known negative impacts of phosphate strip mining on low-income poverty stricken and high-minority communities and jurisdictions. In addition, the DAEIS is inaccurate because environmental analyses did not consider the particular and unique needs of minority populations and low-income populations as required by executive order. Changes and revisions are required throughout the DAEIS in order to correct this legal and moral deficiency.

* Recommendation:

A comprehensive Environmental Justice analysis should be performed for Hardee and DeSoto counties. The development of data and analyses should include a broad effort to extensively involve and objectively educate the residents of these communities as to how their lives, jobs, properties, and other interests may be impacted by area-wide phosphate strip mining.

CUMULATIVE IMPACTS NOT CONSIDERED

* Substantive Comment:

3PR questions the accuracy of information and adequacy of environmental analyses contained throughout the DAEIS, and contends that it is deficient in describing and characterizing the "actual" current, historic, and projected negative effects of regional phosphate strip mining, both individually for the four

proposed mines, and cumulatively for all mining, and the CFPD. 3PR asserts that the following mission statement and stated purpose of the AEIS is not accomplished through the current draft (DAEIS).

*"Based on the continued applications for expanded mining in the CFPD, the size of the project area, the CFPD characteristics, and the **potential environmental impacts, both individually and cumulatively**, of the proposed actions, the Corps will prepare an Areawide Environmental Impact Statement (AEIS) in compliance with the National Environmental Policy Act (NEPA) to render a final decision on the permit applications."*

Many important issues and negative impacts resulting from individual and cumulative effects of large-scale phosphate strip mining are not identified or discussed in the DAEIS and essential "current" and "independent" data and analyses are omitted or not referenced. The DAEIS does not include or consider important basic issues relating to large-scale destruction of ecosystems, the irreparable area-wide impacts to native soils and geology, the destruction of irreplaceable flora and fauna, the elimination of gene pools, or the reduction of biodiversity. Neither have the resources at risk been adequately or competently characterized or quantified, but only generally or vaguely, mainly through data supplied by the Applicants, and from generic sources.

3PR therefore contends that the DAEIS is insufficient for the purposes of evaluating the discrete, direct, or cumulative and ongoing impacts of phosphate strip mining in west-central Florida, and in providing for the stated NEPA purpose of "*Protection of the Environment*". These significant issues and others are presented in more detail in the substantive comments in the following sections.

* Recommendation:

Many questions concerning the cumulative impacts of phosphate strip mining on ecosystem services must be answered before any further consideration of mining is entertained:

- What is the relative impact of the various mining-related activities upon supply of ecosystem services.
- To what extent have various ecosystem services already been impaired by mining, and how are impairment and risk of future impairment distributed as a result of mining.
- To what extent are the different ecosystem services in the study area interrelated.
- How does damaging one ecosystem service influence the functioning of others.
- What proportion and spatial extent pattern of land (ecosystems and restorable areas) must remain undisturbed with the study area in order to sustain the delivery of essential ecosystem services.

"The human economy depends upon the services performed "for free" by ecosystems. The ecosystem services supplied annually are worth many trillions of dollars. Economic development that destroys habitats and impairs services create costs to humanity over the long term that may greatly exceed the short-term economic benefits or the development. These costs are generally hidden from traditional economic accounting, but are nonetheless real and are usually borne by society at large. Tragically, a short-term focus in land-use decisions often sets in motion potentially great costs to be borne by future generations" (Daily 1997).

LOSS OF BIODIVERSITY IGNORED

* Substantive Comment:

3PR vehemently objects to the accuracy of the information and adequacy of the environmental analyses in the DAEIS, because the USCOE has not considered the extremely important issue of "loss of biodiversity. Agency action(s) may therefore contribute greatly to the decline of biodiversity in the Southwest Florida Flatwoods Ecoregion, and contribute to losses globally. Biodiversity declines are not limited to increased rates of species extinction, but include losses of genetic and functional diversity across populations, communities, and ecosystems (Chart 1).

"The wide-ranging decline in biodiversity results largely from habitat modifications and destruction, increased rates of invasions by deliberately or accidentally introducing non-native species (such as "cogongrass", and the many weeds and non-native species encourage by the effects of phosphate strip mining) or over-exploitation (like phosphate strip mining) and human-caused impacts. (Naeem 1999).

"At a global scale, even at the lowest estimated current extinction rate, about half of all species could be extinct within 100 years. Such an event would be similar in magnitude to the five mass extinction events in the 3.5 billion year history of life on earth." (Naeem 1999). In view the chart below it must be considered that "genetic" extinctions occur when a significant portion of a local gene pool is lost/depleted, or when essential genetic traits necessary for reproduction and survival are lost or weakened. Phosphate strip mining has already mostly deleted the gene pools of many species, over wide regions, many of which were mostly locally developed and adapted. A cumulative analysis of genetic erosion caused by the industry is needed.

Chart 1

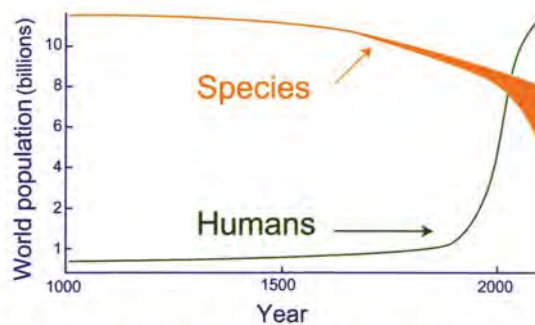


Figure 1 - The predicted decline of biodiversity in association with increases in human populations. Estimates for global biodiversity loss are between 50 and 75% by 2100, but in many transformed habitats, such as crop farms, local declines of similar magnitude have already occurred. (From Soulé 1991 Science.)

"Unprecedented changes are taking place in the ecosystems of the world." "Recent evidence demonstrates that both the magnitude and stability of ecosystem functioning are likely to be significantly altered by declines in local diversity, especially when genetic diversity reaches the low levels of managed ecosystems" (Naeem 1999).

- Human impacts on global biodiversity have been dramatic, resulting in unprecedented losses of global biodiversity at all levels, from genes and species to entire ecosystems.
- Local declines in biodiversity are even more dramatic than global declines.
- Many ecosystem processes are sensitive to declines in biodiversity.

- 624 • Changes in the identity and abundance of species in an ecosystem can be as
625 important as changes in biodiversity in influencing ecosystem process.
626

627 The DAEIS, as written will encourage an onslaught unbridled phosphate strip mining, which will
628 result in permanent large-scale gene pool loss and genetic erosion through irreplaceable destruction of many
629 plant and animal populations, and in the elimination of much of the few remaining large tracts of native
630 ecosystem in the region. The secondary and tertiary impacts of this ecological disaster will extend into the
631 surrounding counties and regions, and far beyond because, due to its vast scale and severity phosphate strip
632 mining is one of the largest single offenders of the environment in Southeastern United States.
633

634 OBJECTION TO DAEIS REVIEW TIME LIMIT

635 Substantive Comment:

636 3PR objects and questions the excessive length of the DAEIS, and to the completely insufficient 60-
637 day time period allotted for review and comment. This restriction is both unreasonable and untenable for any
638 person, any group, or any agency. The length, unnecessary complexity, and lack of clear succinctness, is
639 inconsistent with NEPA, which requires that an EIS not just "*generate paperwork*", but that it should "*reduce*
640 *paperwork and the accumulation of extraneous background data*". NEPA recommends that such documents be
641 less than 150 pages long, or normally less than 300 pages for more complex proposals. The 1,063 page length
642 of the DAEIS is highly excessive, and exceeds the maximum of these recommended standards by well over
643 three fold. In effect, its extreme length and complexity precludes review and comment on all but a few of the
644 important issues and, in so doing, violates the public trust, greatly diminishes public participation, and
645 suppresses public scrutiny.

646 The severe time limit restriction for the DAEIS review and comment has the effect of censoring and
647 effectively precluding public involvement. The USCOE should have mailed every resident a succinct
648 description of the proposed action, including simple summaries which explain the project and describe prior
649 phosphate strip mining, in terms the layperson can understand, including a wide range of photos showing the
650 impacts of phosphate mining from the air and ground, and listing and showing all environmental impacts and
651 concerns. The public must be much more broadly and fully informed about phosphate strip mining so that
652 communities will possess "real" information upon which to base their public involvement and their actions.

653 In addition, the USCOE, almost simultaneously issued notice four individual and distinct mine permit
654 applications which include impact areas totaling approximately 60,000 acres. These documents and related
655 materials are individually voluminous and include many separate exhibits and appendices, and they are
656 repeatedly referred to in the DAEIS. The effect of overlapping the DAEIS review with such vast libraries is
657 that only the most minimal comments are possible:

658 40 CFR 1500.1 Purpose

659 *(c) Ultimately, of course, it is not better documents but better decisions that count. NEPA's*
660 *purpose is **not to generate paperwork**--even excellent paperwork--but to foster excellent*
661 *action.*

662 40 CFR 1500.2 Policy

663

(b) Implement procedures to make the NEPA process more useful to decisionmakers and the public; to **reduce paperwork and the accumulation of extraneous background data; and to emphasize real environmental issues and alternatives.** Environmental impact statements **shall be concise, clear, and to the point, and shall be supported by evidence that agencies have made the necessary environmental analyses.**

40 CFR 1502.7 Page limits.

The text of final environmental impact statements (e.g., paragraphs (d) through (g) of Sec. 1502.10) shall normally be less than **150 pages** and for proposals of unusual scope or complexity shall normally be less than **300 pages**.

Concerned citizens, and interested parties and organizations, have therefore been completely overwhelmed by the amount of documentation contained in these documents, and by the scope of the ancillary documents, research publications, regulations, and website materials which must also be collectively digested and considered in responding to the DAEIS.

Because of the immense, once-in-history importance of the DAEIS, and consideration of the four expansive phosphate strip mining projects, 3PR is compelled to continue and thoroughly articulate this significant issue, and further object to the unnecessary length and complexity of the DAEIS (included its related documents and sources). The public is entitled to a fair and liberal opportunity to thoroughly evaluate the DAEIS, because "**public scrutiny is essential to implementing NEPA**", and because the resulting Area-wide EIS will in large part determine the destiny of an entire region and ultimately affect the lives of millions of people. As phosphate strip mining has done historically, it will most certainly leave a legacy of environmental and economic liability, in perpetuity, resulting from its diverse and comprehensive negative environmental impacts. This is true because phosphate strip mining is non-renewable, non-sustainable. It is a here-then-gone, purely exploitive industry, which leaves an extensively altered and often abandoned, or forgotten, alien landscape in its wake. See Photos 1 through 7.

A thorough review of the DAEIS document alone, not including the time and resources needed to verify any of the data or analyses, would require many months. Advertising for and contracting professional consultants capable of performing a thorough review of such a vast and diverse region, involving such a huge number of severe cumulative impacts and other issues, requires considerable time in itself. A 60-day comment timeframe may be acceptable for a very small, single project, which does not involve native ecosystems and water resources impacts, but is completely inadequate for an action involving a geographic area as great as that of the CFPD, which considers such a large range of extreme environmental impacts, and a report of such magnitude, complexity, and length as the DAEIS.

The DAEIS is a technical document involving terminology, data and analyses from many specialized, even unique fields of industry and science. Its development has taken the USCOE, its cooperating agencies, CH2M-Hill (one of largest industry-support consulting firms of its kind), other consultants and advisors, phosphate representatives and employees, and personnel from various agencies, many months to develop. Even if the resources of private sector organizations and government commenters were unlimited, it would be impossible for even a minimal review of the DAEIS in a just 60 days. In order to perform a review and comment on such a voluminous and technical document, and to actually verify some of the data and analyses provided, a much greater span of time would be required, including time for the field verifications, essential

investigations, and other analyses necessary to generally evaluate and objectively verify the thousands of statements of the DAEIS, and the actual extent, attributes, and status of ecological/biological resources within the CFPD.

RELATED DOCUMENTS LARGE OR INACCESSIBLE

* Substantive Comment:

In addition to the excessive length and complexity of the DAEIS, the document states that information has been taken from a number of other voluminous publications, either by incorporating them by reference, or by vaguely alluding to them, as in Chapter 1.7, "*These documents have helped to inform the USACE as it developed this AEIS on phosphate mining in the CFPD*". Precisely 9 major documents were referred to in Sections 1.7.1 thru 1.7.9. There is no mention of precisely what information, or conclusions were adapted from these documents. Although the USCOE may incorporate by reference, the inclusion of entire encyclopedic documents without references to the specific information or sections used, is both unreasonable and untenable.

Further, the four phosphate strip mine permit applications simultaneous noticed for review and comment, are referred to repeatedly throughout the DAEIS (e.g. ES.5.2). To 3PR's knowledge, these documents were not previously and formally made available to the public, or either their availability was not widely advertised or known.

Also, copies of the publications cited in Chapter 7 "References" are not included in the DAEIS. Many of these can only be obtained in physical form from distant repositories, or from paid digital document services, or may not be publicly or conveniently available at all. This problem adds significantly to the time and resources needed for review and comment and, in many instances, precludes objective verification where information from these references may have been cited or incorporated into the DAEIS.

A related issue is that private research and possibly other documents have been submitted to the USCOE by the Applicants, some of which are in-house reports or letters, or unpublished studies conducted by private concerns which have been presented in legal arguments relating to the interpretation of provisions for the development of the DAEIS, or the process through which it was to be developed, although not cited in the DAEIS. There is no reasonable means, other than continuous Freedom of Information Act requests for "any new documents", through which 3PR could officially become aware of these reports, or gain insight into the degree to which they may have been considered in the review and/or development of the DAEIS.

3PR therefore questions the adequacy of the DAEIS, and the accuracy of its information, in that it does not cite these documents, and therefore circumvents or diminishes the NEPA "*public scrutiny*" requirement. These include, but are probably not limited to, the following documents cited in a 25-Apr-2010 "hand-delivered" letter from Deedra Allen (Mosaic):

Potential Future Mining Areas in the Central Florida Phosphate District, Environmental Consulting, Technologies, Inc.

Water Quantity Issues Associated with Phosphate Mining, Dr. John E. Garlinger, Ardaman Associates, Inc.

Stream Condition Assessments and Stream Reclamation in the Central Florida Phosphate Mining District, Environmental Consulting & Technology, Inc.

Characterization of Forested Seepage Swamps on Mosaic Lands in the Bone Valley of West-Central Florida, Dr. Shirley Denton, Cardno ENTRIX.

Why we need to mine Phosphate Rock in the United States, Ken Nyiri, CRU.

Surface Water Quality Associated with Central Florida Phosphate Mining, Dr. Douglas Durbin, Cardno ENTRIX.

Comments and Corrections of the Peace River Cumulative Impact Study, Joshua W. House, Mosaic Fertilizer LLC.

When 3PR asked for a copy of one the documents from its author, the request was politely refused by stating "I'll have to get permission from our (phosphate mine) client".

DAEIS INAPPROPRIATE AND POOR QUALITY

* Substantive Comment:

In addition to all other issues commented on herein, 3PR has determined that a very large number of errors, omissions and internal inconsistencies exists in the DAEIS. These include, but are not limited, inconsistencies in various wetland acreages of wetlands to be dredged, mining and reclamation time periods, incomplete and inaccurate tables, large quantities of included irrelevant, erroneous, and misleading pro-phosphate-mining content which read like phosphate company sponsored newspaper and TV ads, grammatical and organization errors, and countless omissions of important data, analyses, tables, maps and exhibits readily available from public sources. Often highly significant issues and concerns are ignored, omitted, or summarily dismissed with little or no analysis or comment. The DAEIS is obviously, for many reasons, not a product which should have been presented to the public for review and comment. The USCOE must consider the unnecessary expenditures of time and resources, and other impacts to the citizens, businesses, and other organizations which are concerned with phosphate strip mining, in releasing such an inappropriate proposal for public review and comment. The DAEIS should be concise, accurate, objective, and soundly supported by data and analysis developed and presented independent of the Applicants.

PERMIT DURATIONS FAR TOO LONG

* Substantive Comment:

3PR objects to the issuing of phosphate strip mine permits (such as 404 CWA and other permits and approvals), which are valid for periods greater than 5 years. (1) Phosphate strip mining and its related activities are very intensive industries which create large-scale and far-reaching impacts within short periods of time. Granting long-term approvals of up to 30 years or more, and planning mining nearly 80 years into the future is absurd. These massive projects disturb very extensive tracts of land, destroy large tracts of native ecosystem and wildlife habitat, and induce rapid changes in local communities and economies in profound, significant, and often irreversible ways. It is highly important that permits expire within reasonable periods of time so that federal, state, regional, and local governments, and especially local communities, may reevaluate such projects in accordance with society's constantly changing needs.

The durations of the permits of currently approved phosphate strip mines are unacceptable, especially when the extensive negative impacts are considered collectively, that is cumulatively. To approve four new mines with such extremely excessive durations is unconscionable. Considering the 300,000 plus acres of past phosphate mining impacts, with the existing mine permits considered collectively, and adding the four projects described in the DAEIS, the cumulative impact will be the utter destruction of much of eastern west-central Florida, plus potentially massive impacts to "downstream" jurisdictions and coastal communities such as Charlotte, Lee, and Sarasota counties.

Issuing permits and approvals for phosphate strip mining for such extended durations represents an injustice to society. Such long-term approvals preclude affected communities from being able to respond to changes in societal needs including, but not limited to, protection of public health and safety, changes in the economy, natural disasters and disaster response, increases in the need for local natural resources including food from traditional local agriculture. It is therefore essential that only the shortest possible permit durations be granted.

* Recommendation:

In no case should any phosphate strip mining permits be issued or granted for time periods extending five years. Within this 5-year span, permit compliance and local community must be reviewed at least annually. Also, because phosphate strip mine "extensions" are actually "new" mining, all extensions must be permitted as individual phosphate strip mines. No projects which do not currently have permits should be granted until the historic cumulative impacts of phosphate strip mining in the CFPD have been completely evaluated, and until phosphate strip mining technologies can be developed which may allow some limited mining to take place in an environmentally acceptable manner. Also, the cumulative analysis is needed in order to determine the additive impacts and contribution of other factors by the currently permitted or operating mines.

IMPROPER PURPOSE AND NEED

* Substantive Comment:

3PR objects to the "purpose and need" as stated in the DAEIS. "The Applicants' purpose and need forms the basis for the alternatives analysis. The purpose and need for an Environmental Impact Statement is ***"Protection of the Environment"*** in federal actions. Nowhere is this NEPA directive found in the DAEIS. The position taken by the USCOE is inconsistent with federal law, and has the effect not only of promoting phosphate strip mining, but to virtually assure and predetermine that alternatives proposed by the Applicants are approved (permitted). This position taken by the USCOE effectively excludes Alternative-1 ("No Action" / "no permit"). It is clear that all of the other alternatives are merely additional scenarios acceptable to the Applicants. In actuality, NEPA requires that ***"the agency"*** propose the ***"alternatives, including the proposed action"***, not the Applicants.

40 CFR 1502.13 Purpose and need.

The statement shall briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action.

* Recommendation:

The "Purpose and Need" for the AEIS should be changed to: "The purpose of the proposed action is "Protection of the Environment" via comprehensive analysis of the direct and cumulative environmental impacts of phosphate strip mining in the CFPD, and assuring the protection the natural environmental, public health safety, and the conservation of water and air resources in considering federal permit applications."

MINING NOT A TEMPORARY IMPACT

* Substantive Comment:

Phosphate mining has often been presented by the mining industry as a "temporary" disturbance of land. However, it is unrealistic and inaccurate to assert that a 30-plus year mining project is a "temporary" disturbance, or that large-scale removal, disturbance, mixing of native soils, and construction of CSAs and phosphogypsum stacks, maintenance corridors, ditches, berms, pipelines, and processing facilities, will result in anything other than "major", "long-term", and complete destruction to native ecosystems, as it has with phosphate strip mining in the past. Mined land, whether in the process of being mined, whether reclaimed or not, is an impediment to wildlife and ecosystem function through habitat fragmentation, the creation of physical barriers, altered hydrology, soil changes, and many other problems. Mined land fragments habitats and prohibits wildlife from moving within their home ranges and thus restricts them from the resources needed for their survival and reproduction. In addition, the disturbed, physically altered, often chemically different soils, promotes the spread of nuisance and/or exotic opportunistic plant species that, under these conditions, invade, exclude, and/or preclude native species and habitats on-site and, through dispersal mechanisms, jeopardize the integrity of adjacent native habitats, and well beyond.

* Recommendation:

The diverse, extreme, and usually permanent impacts associated with phosphate strip mining must be considered honestly. A brief tour by air and ground through the phosphate mining district will dispel any myths concerning the level of impacts and destruction created by this industry. Seeing is knowing and believing.

Questions regarding whether phosphate strip mining should take place must be decided in an academic environment, while seeking out and acknowledging the difficult problems which must be overcome in order to find methods of phosphate mining which impart only acceptable impacts. Phosphate mining is an industry in business for profit. From the industry's perspective its mission is no doubt to increase efficiency and make more money. Profit must in no way be the basis of decision-making where the NEPA mission of "Protection of the Environment" is concerned.

CUMULATIVE IMPACT ANALYSIS

* Substantive Comment:

3PR questions the adequacy of the environmental analyses and accuracy of the information in the DAEIS, because it does not evaluate the ALL-IMPORTANT "cumulative" impacts which the phosphate strip mining and certain associated industries have inflicted on west-central Florida. In general, the DAEIS effectively avoids and obfuscates meaningful discussions and analyses relating to cumulative impacts.

A comprehensive cumulative analysis of all significant potential impacts must be a primary requirement and prerequisite before issuing new phosphate strip mining permits. The DAEIS states "*The temporal scope of the cumulative impact analysis is based on the overall operational periods of the four proposed actions, plus any overlap with the operational period of the two reasonably foreseeable actions.*" This concept does not include the historic impacts of phosphate strip mining, which have been extremely extensive, and therefore does not constitute a cumulative impact analysis. NEPA is explicit that cumulative impacts include "past", "present", and "future" actions regardless of their sources, scale, or scope:

40 CFR 1508.7 Cumulative impact

Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

The DAEIS does not accurately identify or quantify, as required by NEPA, all of the direct and indirect impacts resulting from past and on-going actions (prior to 1978). No maps, illustrations, analyses, or narratives adequately or sincerely consider the incredibly massive environmental disaster of historic and ongoing phosphate strip mining. Comprehensive analyses are needed in order to accurately determine the existing status of significant aquatic/hydrologic/biologic resources, which in turn, are necessary to determine the "real" impacts of the proposed projects on significant resources within the CFPD and in the other "downstream" regions which will obviously be affected. Further, because surface and ground waters are very vulnerable to incremental impacts, and because their cumulative historical impacts are overwhelmingly significant, it is absolutely essential that the USCOE expand the temporal scope of the AEIS to also identify and analyze all direct and indirect past major actions needed to accurately describe the direct, indirect and cumulative impacts the four proposed phosphate strip mining projects on existing and projected human resources and needs. That is, comprehensively evaluate all of the known and potential environmental and social impacts of phosphate strip mining in west-central Florida, past, present, and future.

An essential element of cumulative analysis involves the phosphate strip mining industry's tremendous generation of waste clays. Because waste clay disposal areas (CSAs) permanently reduce recharge of the surficial aquifer and lateral base-flows to adjacent streams in the regions they occupy, the DAEIS should be revised to identify, map and calculate the total acreage of clay settling areas to be constructed. Further, the total of post mining pits/ponds/lakes, which also significantly reduces stream and river flows to the estuaries, need to be identified and their impacts quantified. To this, add the millions of gallons per day in stream flows lost to the many sinkholes created, in part, by the consumptive use and withdrawals associated with phosphate strip mining. Very comprehensive and intensive analyses of the historic hydrology of the relating to the phosphate mining district are needed.

The information and analyses provided in the DAEIS does not fully identify or quantify the many adverse, permanent impacts caused by 350,000 acres of past mining (which occurred before the State's Mandatory Reclamation Rule). This serious omission invalidates any conclusions assigned to cumulative

903 impacts. Ironically, the DAEIS maintains that the analysis of cumulative impacts is one of the most important
904 elements of an EIS, although the information in the document does not reflect this value.

905 Conspicuously missing from the DAEIS are photographs of the many aspects of phosphate strip
906 mining which would be informative to the public, and which would genuinely characterize and depict
907 phosphate strip mining activities, etc. The body of the document contains exactly 1 photograph of a dredge
908 peacefully floating in a lake. In reviewing the DAEIS a question arises as to how much time the USCOE
909 personnel listed in the "List of Preparers" actually spent in active and reclaimed phosphate strip mines. Most
910 how visit the phosphate mining district return with many photographs, a few artifacts, and clay-gummy shoes.

911 The current age is a digital one. We live in a "visual" world. Literacy is at an all time low in central
912 Florida, with graduates reading at or below 8-grade levels. Language is also a barrier (discussed elsewhere).
913 The DAEIS is devoid of adequate visual representation and communication appropriate to inform the general
914 public concerning phosphate mining, especially materials which would be appropriate to educate the
915 proportionally high minority and low-income populations of Hardee and DeSoto counties some of which
916 exhibit low levels of educational attainment. The DAEIS fails to communicate in every regard, through its
917 exceedingly poor organization and lack of clarity and measurability, through inestimable numbers of errors,
918 omissions, internal inconsistencies and improper content [incorporated here by reference: the DAEIS
919 additional comments submitted collectively on behalf of Manasota-88, People for Protecting Peace River
920 (3PR), Protect Our Watersheds (POW), Sierra Club Florida Phosphate Committee. The comments of which
921 speak to many technical deficiencies of the document], and because it does not attempt to accommodate the
922 general public through adhering to the NEPA requirements of concise and meaningful succinctness.

923 * Recommendation:

924 Before any new phosphate strip mining applications are considered, it is scientifically essential and
925 morally imperative that all mining, past, present, and proposed, be comprehensively evaluated in terms of its
926 cumulative impacts to the environment and human society. The analyses should include evaluations extending
927 as far back in time as records or evidence exists. See the 3PR "Significant Environmental Issues" section, and
928 other comments relating to the essential need of fully evaluating the cumulative impacts of phosphate strip
929 mining.

930 931 ADDITIONAL HYDROLOGIC / EVAPOTRANSPIRATION IMPACTS

932 * Substantive Comment:

933 3PR questions the adequacy of the environmental analyses in the DAEIS, because it fails to address
934 the tremendous negative hydrologic impacts from phosphate strip mining, past, present, and predictable for the
935 future, even though a very considerable body of very broad-ranging, multi-disciplinary scientific research has
936 determined these problems.

937 The primary land-altering and re-contouring activities of phosphate strip mining comprehensively
938 destroys watersheds and hydrology, greatly altering and compromising patterns of runoff, and regionally
939 altering aquifer recharge, especially the inducing or increasing of recharge to the IAS and FAS. The vast
940 historic areas of dry prairie (flatwoods / pine-palmetto flatwoods) are removed along with their native soils,

many of which included spodic horizons which restrict recharge near the soil surface and maintaining the seasonally high ground water levels needed to support the ecosystem. These native soils, which are essential to the self-sustaining existence of native plants and wildlife are removed by the phosphate strip mining process and are replaced by unnatural Arents-Hydraquents-Neilhurst substrates. This results in profound impacts to local and regional hydrology by altering low-flow and patterns of low-flow, changes in recharge (inducing or reducing recharge, depending on various factors), increasing or reducing runoff (depending on various factors), and eliminating or substantially altering seepage regimes, and other hydrology.

One of the hydrologically significant aspects of removing and/or disrupting vast regions of native soils and replacing them with materials which exhibit vastly different properties, constructing many large CSAs, re-contouring much of the landscape, and also creating many open bodies of water where virtually none existed before, is that evapotranspiration (ET) rates and coefficients are altered over large areas. Open bodies of water often have the highest ET rates.

A reevaluation of ET rates is needed which better establishes the moisture lost from the many open water bodies and inundated areas created by the phosphate strip mining industry, whether temporary, or permanent. A cumulative analysis of ET especially needed so that water lost may be determined for all past, present and future phosphate strip mining..

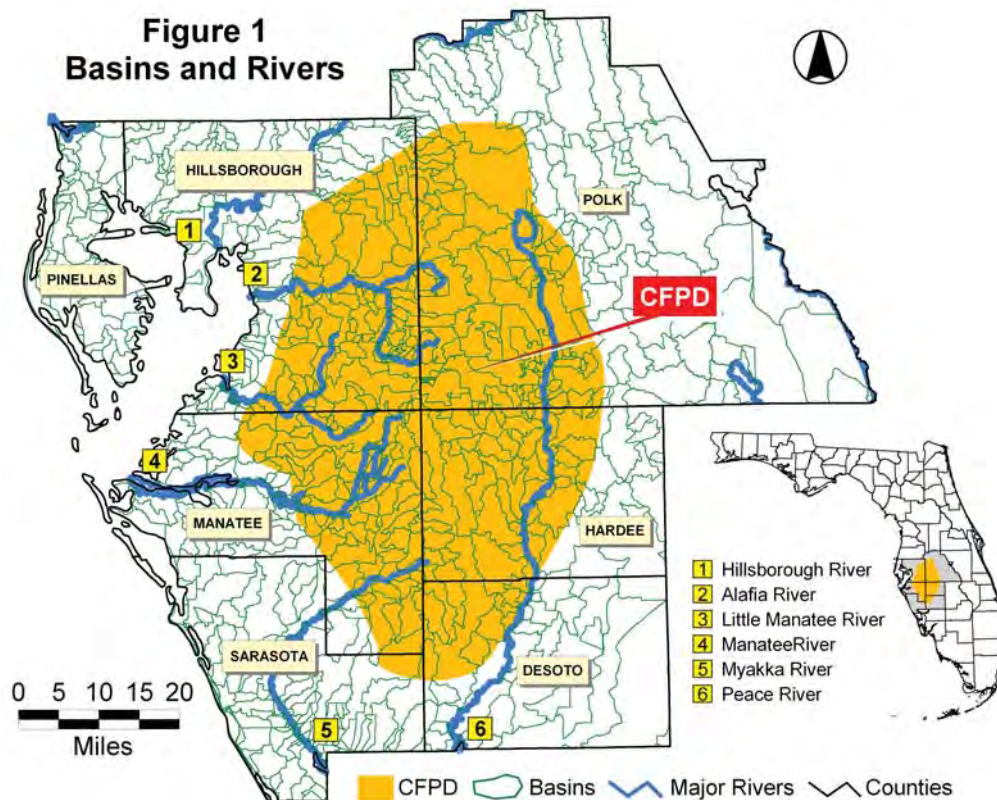
DESTRUCTION OF A VERY LARGE NUMBER OF BASINS

Substantive Comment:

3PR further questions the reasonableness and fairness of the abbreviated DAEIS review and comment timeframe, because of the importance of the resources at risks. The CFPD includes a large portion of the diverse physical and hydrologic features, and extensive environmental and biotic assets of west-central Florida. As a single example, the CFPD includes vast areas in the headwaters of 7 major watersheds, and 269 drainage basins (Figure 1). Of the 269 basins, 195 are entirely included, approximately 30 are about "90%" included, and only about 44 are less than 90% included⁵. Although not all of this region has been mined, or is planned to be mined, it is reasonable to assume that it will be mined at some time in the future. The four proposed phosphate strip mining permits will impart extremely large impacts within the CFPD.

⁵ FDEP GIS data sets: Conceptual Phosphate Mineable Limit; Drainage Basins 1997 (areas).

**Figure 1
Basins and Rivers**



UNQUALIFIED ECOSYSTEM STUDIES

* Substantive Comment:

3PR questions the accuracy of information and the adequacy of the environmental analyses in the DAEIS, because it does not include adequate assessments of these native systems, or include competent site-specific (on-site) evaluations and ecosystem analyses of these irreplaceable biosphere assets as is required by NEPA. West-central Florida, and in particular the xeric uplands and certain other vegetative communities and ecosystems which occur within the CFPD, are known to support unique floras and other ecologically specialized biota. Because the vegetative communities have not been adequately classified, and their ecological requirements are unknown, it is not possible consider their values and provide the proper protection required by NEPA. In Chapter 8 "List of Preparers", the DAEIS does not list any regional experts, or any experts, qualified in the fields of systems ecology, plant ecology, or botany. Of the specialist cited as preparers of the DAEIS, Steven Gong (CH2M-Hill, Project Manager) has a zoology degree from the University of Florida, and Tunch Orsoy, (USCOE, Ecology Lead) has a marine science degree from the University of South Florida. None of the officials or scientists listed as "preparers" possessed (or possess) regionally recognized expertise with the environs of the Southwestern Florida Flatwoods Ecoregion. As commented on later, NEPA requires the agencies to be sufficiently capable of independently evaluating an EIS, including the work done by others, even though external consultants and assistance may have been retained for much of the work.

The expansive and diverse landscape of the CFPD, and the included regions involved in the proposed permits or alternatives fall with the Southwestern Florida Flatwoods Ecoregion, and as such, are characterized

by highly complex, regionally unique, combinations of topography and hydrology, and very extensive globally unique ecosystems and regional wildlife food webs. Because the southern half of this region supports extensive xeric upland areas that are distinctly separated from other major ridges and uplands systems (particularly in Manatee County), its vegetative communities have recently been found to include additional unique endangered species. Several species thought to have been extinct in the region have also been found, and additional unknown taxa are under scientific review. These discoveries indicate a highly unique floristic region; one that is being rapidly pushed towards extinction mainly by the phosphate strip mining industry.

Additionally, research in molecular phylogenetics is regularly revealing new genetically distinct species, many of which are monophyletic. Areas of native ecosystems involving the four proposed phosphate strip mining proposals (including all alternatives), as well as potentially restorable lands which have reasonably intact native soils and geology, must be protected until genetic studies can be conducted in these regions. There is considerable potential that genetically unique taxa will be discovered in this region when such studies are conducted.

USCOE INSUFFICIENT CAPABILITY TO EVALUATE DATA AND ANALYSIS

* Substantive Comment:

3PR questions the accuracy of information in the DAEIS, because the USCOE project team does not individually or collectively possess the full in-house capability of developing a document which is technically sufficient and competent, or which would be necessary in order to evaluate the work of external consultants and sources, thereby assuring NEPA compliance. The DAEIS is therefore inappropriate for ensuring the protection of important native ecosystems and other biota, including upland ecosystems and other related considerations.

40 CFR 1507.2 Agency capability to comply
*Each agency shall be capable (in terms of personnel and other resources) of complying with the requirements enumerated below. Such compliance may include use of other's resources, but **the using agency shall itself have sufficient capability to evaluate what others do for it.***

Ecological impacts are predicted by "*professional knowledge of plant and animal life and their habitat requirements, professional judgment of the biotic community's ability to withstand or respond to disturbance, professional experience with the impending changes and impacts, and results from similar studies, and common sense (a biologist who simply lists the names of organisms observed on the site - without an interpretation of key life histories, ecological interrelationships, and habitat requirements -- misses the primary intent of the environmental impact report*" (Rau & Wooten 1980).

UNIQUE PHYSIOGRAPHY / GEOMORPHOLOGY

* Substantive Comment:

3PR questions the accuracy of the information and adequacy of the analyses in the DAEIS, because values and attributes associated with unique physiography / geomorphology were not properly evaluated and considered. The important assets found in the biological, physical/geomorphologic, aesthetic, and geological uniqueness of the various physiographic regions found within the CFPD, and within the geographic extents of

the four proposed phosphate strip mining projects (including the various alternatives), were all but ignored in the DAEIS. Especially lacking in the document was any thorough evaluation of impacts and measurable guidance for protecting the important resources and attributes which relate to physiography/geomorphology.

Most of the various physiographic / geomorphologic features of central Florida, including west-central Florida, are known as regions of high biotic endemism and ecosystem specialization. Because, in 3PR's opinion, the preparers of the DAEIS are not qualified to evaluate these specialized features, regions, and areas of potentially high endemism, and because there is no evidence of their personnel having sufficient experience or expertise in west-central Florida ecosystems and regionally-specialized areas of biological sciences, the document is intrinsically flawed, inadequate, and inaccurate, or simply unqualified in this context. Additionally, its statements and conclusions in regard to ecosystem resources are unqualified in that no appropriate, adequate site-specific ecosystem evaluations were conducted by qualified regional biological research institutions, or qualified regional experts, using modern biological and ecological techniques and resources. NEPA requires that environmental components be properly evaluated so that the best possible decisions may be made. The data and analyses which are needed for the protection of ecosystems, specialized vegetative associations and biota are highly site specific. Species lists and general descriptions do not provide the levels of ecological understanding necessary to evaluate important NEPA conservation decisions.

Aesthetic value is also a highly important value associated with geomorphology. Ridges, valleys, plain, and unique regional feature are important to the identities of people, communities, and regions. The DAEIS ignores or omits consideration of the fact that phosphate strip mining complete transforms regional character and regional and community identity. With most people, there is tremendous pride and sentiment associated with the physical and environmental character of the areas they live in.

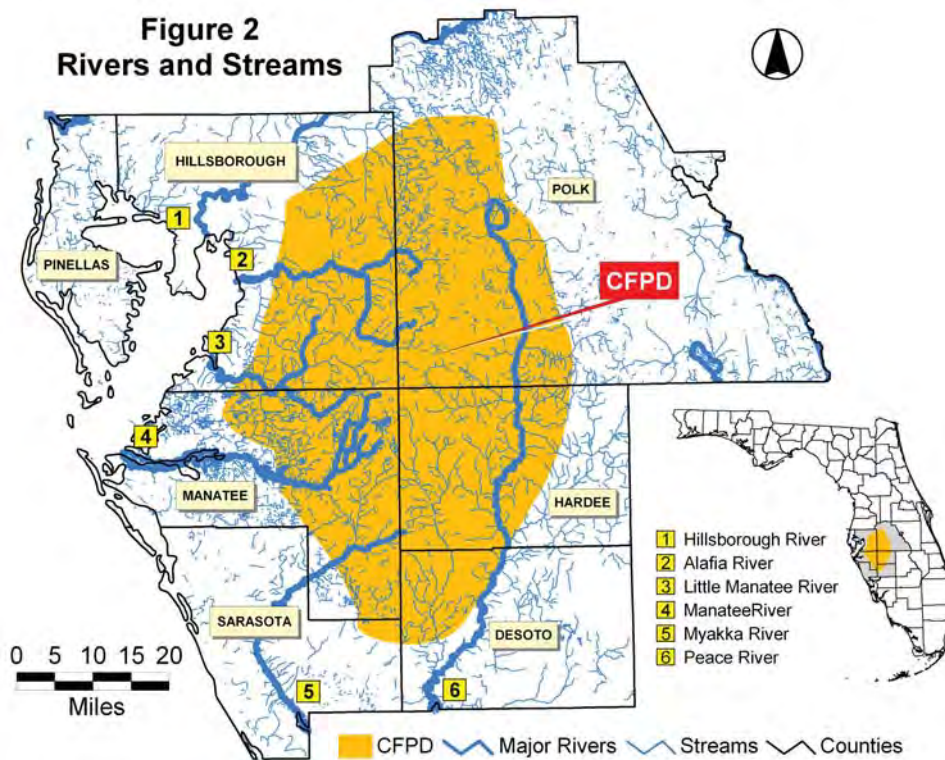
PHOSPHATE STRIP MINING IMPACTS 5 MAJOR RIVERS

* Substantive Comment:

The region within the CFPD provides the primary sources and flows of clean, life-giving water to the numerous bays, estuaries, and inlets, both large and small, along the west Florida coast. Comprehensively destroying the vast native wildlife ecosystems in this area, and disrupting native soils and geology, will adversely impact the fisheries, marine ecosystems, essential estuary systems, wildlife sanctuaries, property values, including waterfront properties, businesses, and other coastal and "downstream" physical and environmental assets, as well as the quality of life in the most densely populated regions of west-central Florida, which are located near the coast and along rivers and waterways, mainly in Lee, Charlotte and Sarasota counties.

The CFPD is the source of 5 major rivers and includes part of the drainage basins of 2 others (Hillsborough River and Withlacoochee River), 1 minor river (Braden River), approximately 150 named creeks and streams, and large number of unnamed tributaries and small streams or water courses (Figure 2).

**Figure 2
Rivers and Streams**

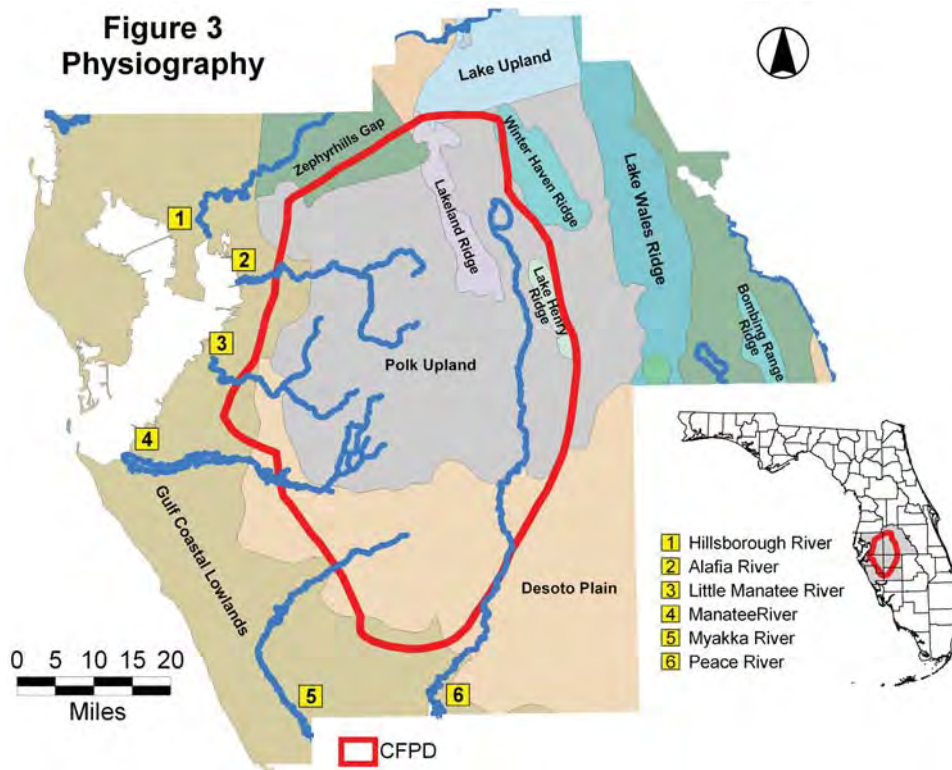


The southern half of the CFPD in the Southwestern Florida Flatwoods Ecoregion supports one of the most dense and diverse mosaics of wildlife habitats and ecosystems extant in central and south Florida. The wildlife habitat in the CFPD represents the bulk of the little remaining high-quality wilderness in west-central Florida. This region is one of the last great repositories of Florida wilderness, and the most invaluable, self-renewing, essential and irreplaceable upstream asset upon which coastal fisheries, rookeries, and marine spawning grounds from Hillsborough County southwards to southern Lee County utterly depend. It provides primary "ecosystem services", that is, environmental sustenance for humans, animals and plant life in west-central Florida.

Because open public access to most of the lands within the CFPD has not been available, many of its great tracts of native land in Manatee, Hardee, Desoto, and Sarasota counties have not been adequately explored zoologically and floristically! No comprehensive searches have been conducted for species which may be "unknown to science". Even so, private scientists have made major discoveries including the discovery of several new plant species as well as several species formerly believed to be extinct in the region. It is clear that the DAEIS does not address the astounding diversity and concentrations of wildlife which exists in this region. Although not reported, or not accurately reported by the phosphate industry, limited local government surveys and observations have revealed ecosystems supporting a remarkable abundance of animal life as well as diverse and pristine natural plant communities. In addition to endangered flora and fauna occurring in the native ecosystems, very large populations of deer, gopher tortoise, snakes, other reptiles, turkeys, and numerous birds and other animals are abundant. Some of the native vegetative communities found within the CFPD may represent the last of their kind in west-central Florida. That is, no site-specific, current, relevant studies were

conducted by independent scientists and used as a basis for development of the DAEIS in fulfilling its NEPA mandate of "*Protection of the Environment*".

As stated, the vast geographic footprint of the CFPD extends across many unique landscapes, ecosystems, and physiographic features. These physiographic features/regions, generally depicted in Figure 3 (based on, White 1970), are the result of distinct, and mostly independent, natural histories. Each is characterized by a unique set of soils, geology, and geomorphology. As a result of unique natural histories and other regionally specific attributes, and because of the isolating factors and pressure they apply, each region supports distinct elements of flora and fauna, and distinctly different ecosystems.

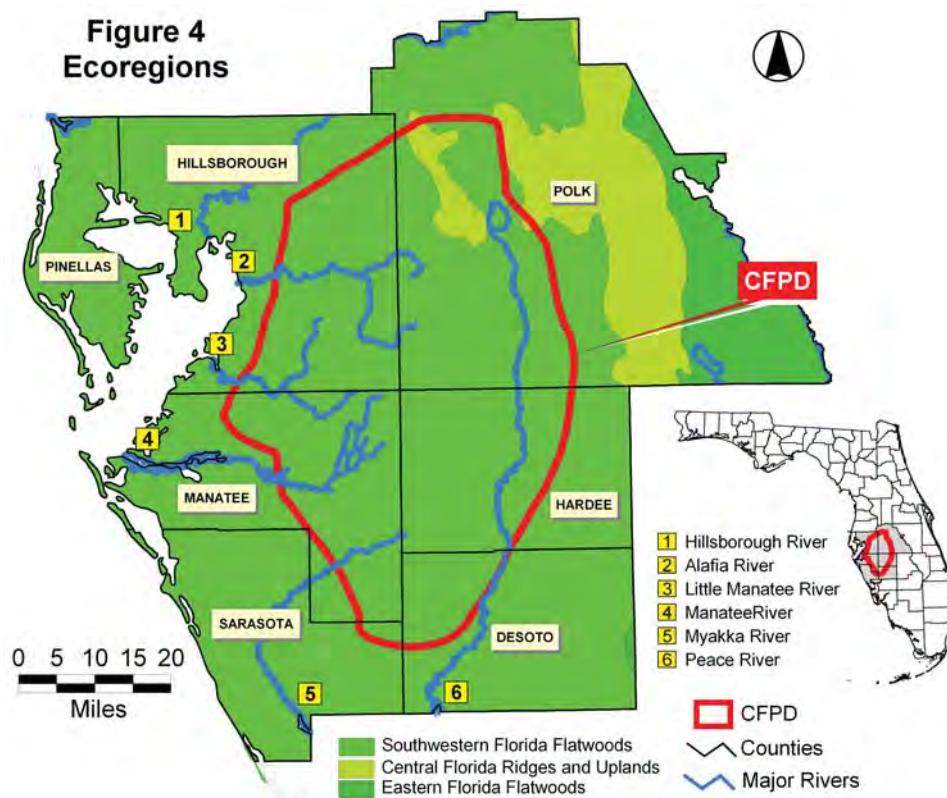


LACK OF CONSIDERATION FOR ENDEMISM AND GENETIC DIVERSITY

* Substantive Comment:

3PR questions the adequacy of the environmental analyses and the accuracy of the information provided in the DAEIS, because it does not adequately or accurately evaluate or consider the fact that phosphate strip mining has destroyed much of the central Polk Upland, and is currently destroying some of the last vestiges of the Lake Henry Ridge, a unique geomorphologic feature with only small fragments of its original native ecosystem remaining. Also not adequately addressed in the DAEIS, are the xeric uplands and xeric upland systems of western Hardee and eastern Manatee counties. These environs are essentially unknown in the scientific literature, are of great interest to science, and of great importance to environmental conservation.

**Figure 4
Ecoregions**



Many important wildlife areas have been completely eliminated by phosphate strip mining and other land uses. No trace remains of entire biotic systems which once existed before phosphate mining. The DAEIS is inadequate and inaccurate in that, in the context of unique ecosystems and endemism, there is no discussion of, or consideration for, the unique geomorphology within the CFPD impact area, nor is there a discussion of the "biogeography" of the endemic and/or listed plant and animal species in these distinct, unique regions. The terms "geomorphology", "biogeography", "endemism", "endemic", "genetic", "genetic diversity", and "critical habitat" (except in the glossary), do not appear anywhere in the DAEIS. The DAEIS does contain some discussion of physiography (i.e., "physiographic" regions), but not in the context of plant and animal endemism, specialization of ecosystems, regional aesthetic character and value, and certainly not in terms of the NEPA EIS requirement of "*Protection of the Environment*".

Conspicuously omitted or absent from the DAEIS are investigations and discussions of plant and animal endemism. Objectively verifiable, site-specific, comprehensive ecological surveys should have been prepared specifically for the DAEIS by third parties, or recognized regional experts.

SPECIAL ECOSYSTEM ANALYSES NEEDED

* Substantive Comment:

3PR questions the accuracy of the information and the adequacy of the environmental analyses in the DAEIS, because it does not properly characterize the invaluable, irreplaceable, and virtually (in scientific terms) "unknown" natural resources within the CFPD, including the project sites of the four proposed

phosphate strip mines, including the various alternatives. If the remaining fractions of natural ecosystems and vegetative and wildlife communities are not protected through the final AEIS, a monumental ecological and environmental catastrophe will result for west-central Florida.

* Recommendation:

The USCOE should consult with Archbold Biological Station for the purposes of developing plans for conducting comprehensive ecosystem analyses in the regions containing the four proposed mine permits (including the various alternatives) and throughout the remaining natural areas of the CFPD. These base studies are essential for competent and objective review of phosphate strip mining applications, including the cumulative impacts which they would potentially contribute. The studies fully analyze and provide a classification system for regional vegetative communities within regional ecosystems by correlating native flora components to their essential ecological, edaphic, geologic, topographic, hydrologic, and climatic requirements. At a minimum, ecosystem classification base studies, necessary for further analyses, should be of similar design and include the same level of analysis as those conducted by the Natural Resources Flight of the US Air Force Range at Avon Park (Orzell & Bridges 2006). The cumulative effects of multiple stressors should also be analyzed for the extant ecosystem and biota of the CFPD.

DAEIS GENERALLY INAPPROPRIATE

The DAEIS is insufficient and inappropriate in its range of content. It includes many sections of irrelevant, superfluous, and unnecessary content. Federal law required the DAEIS be clear, concise, and condensed.

The DAEIS is inappropriate in that it mostly avoids the "Purpose" for issuing an Environmental Impact Statement under NEPA, which is "*Protection of the Environment*". 3PR perceives that the DAEIS disproportionately favors the desires and positions of the Applicants throughout: which is to strip mine nearly every available acre! NEPA requires that the focus of the DAEIS "*shall*" be on "*significant environmental issues and alternatives*", not on furthering or ensuring the goals the Applicants.

The "Assessing Environmental Impact" section of The Environmental Impact Analysis Handbook (Rau & Wooten 1980) identifies several deficiencies in biotic impact assessment reporting which should be avoided:

- (1) "Evasion of possible impacts and lack of their assessment."
- (2) "Omission of pertinent information necessary for unbiased evaluation of impacts."
- (3) "Inadequate descriptions of adverse impacts."
- (4) "A plethora of biotic data or information without interpretation or correlation with possible impacts."

The DAEIS is inadequate and inaccurate because it clearly contains and furthers the above listed deficiencies. 3PR specifically addresses these deficiencies and provides evidence and documentation of their existence and deleterious effects on the DAEIS throughout its comments.

The DAEIS "omits" discussion of elevated radiation levels relating to phosphate strip mining, including potential threats to human health and safety, plants, animals (particularly birds), and to the general environment. It "omits" discussion of the extensive infestations of the noxious species known commonly as

"Cogongrass" which is and will continue to have profound and wide-spread impacts on the environment and economy of west-central Florida, particularly in and around areas of the phosphate industry's "reclaimed" lands. It "omits" important research relevant to "*Protection of the Environment*" within the CFPD, and also proper evaluations and characterization of ecosystems and biota (see quotes in next paragraph) which are important to examine in order to assure public health and safety. It is "inadequate" in that through its omissions, and generally throughout its narratives, it does not clearly and completely describe the potential adverse impacts to the environment. In fact, these impacts should be clearly and prominently tabulated for the lay person to fully comprehend, because such is a primary purpose of NEPA through public involvement, public scrutiny, and Environmental Justice. Further, the DAEIS clearly consists of a "plethora" of data and information much if not most of which is not accompanied by clear correlations to the possible or probable negative impacts of phosphate strip mining. The DAEIS is therefore unacceptable and inappropriate in these regards.

The process of preparing the DAEIS should have involved the development of high-quality, site-specific, independently developed and objectively verifiable data, which should have been immediately made available for public scrutiny and certification. In terms of ecosystems and biota it is necessary that the DAEIS provide "*an evaluation of the key plant and animal species, to give an ecological perspective of important species present, and to evaluate the biota in a regional context. This observation comes from direct observation and study on the site*" (Rau & Wooten 1980). As explained in this section of 3PR's comments, and as detailed in others, the DAEIS does not provide an adequate "*evaluation of the key plant (species)*" because it is not based on current site-specific data and direct observation of the study area (the CFPD, including all permit alternatives), it does not competently list and provide relevant discussions as to the conservation of specialized, rare, or protected flora. It does not discuss the important and relevant aspects of plant endemism, and does not consider the protection of biodiversity and genetic diversity. The DAEIS is therefore inadequate and incomplete in this regard. Note: It seems important that these issues be addressed at public forums where regional experts have been invited to participate. NEPA requires that contributions to the EIS process be "solicited". An obvious deficiency in the DAEIS is a lack of knowledge and understanding concerning the environs (mainly the Flora of the southern half of the CFPD).

Because of the extremely inadequate review and comment period allotted, 3PR's comments will represent only a small fraction of the many important concerns and disputable issues found in DAEIS. As expressed in detail in previous narratives, it is clear that no individual or organization would be capable of evaluating the huge amounts of data, analyses, information, external documents, and references, and respond to a reasonable number of the issues and concerns under such time constraints.

SIGNIFICANT ENVIRONMENTAL ISSUES

* Substantive Comment:

3PR asserts that the DAEIS is inadequate and inaccurate in accomplishing the legal NEPA purpose, because numerous highly significant environmental issues relating to the negative environmental impacts of phosphate strip mining, are either entirely omitted, or not adequately or accurately addressed in the DAEIS. Nowhere are these important concerns sufficiently considered, either individually, collectively, or cumulatively

in full consideration of known negative impacts of historic and current phosphate strip mining. A considerable body of scientific literature exists which is omitted and ignored through the DAEIS. These highly significant and relevant issues include, but are not limited to (in no particular order of ranking):

- Increased radiation exposure as short-term and long-term public health risks, and threats to plant and animal life.
- Region-wide destruction of native ecosystems and vegetative communities through direct destruction or disturbance of their specific native soils and geology [of particular concern is the dependence of the native vegetative communities of the Southwestern Florida Flatwoods Ecoregion on highly specialized soils and geology].
- Large-scale destruction of critical habitat for endangered and threatened plants and animals, including those federally listed, and those listed by local, state, and regional agencies.
- Extensive regional habitat fragmentation involving tremendously broad gaps between intact ecosystems.
- Vast infestations of cogongrass and other invasive, noxious, or weedy plants which dominate the disturbed, non-native, unnatural substrate left after mining.
- Large-scale, permanent loss of genetic diversity through direct destruction of large tracts of native ecosystems, and their cumulative impacts.
- Complete eventual destruction of 195 entire natural drainage basins in the CFPD.
- Area-wide deforestation and its regional and state-wide impacts.
- Lack of consideration for newly discovered/described taxa.
- Creation of extensive above-ground clay waste disposal facilities (misnomered as "clay settling areas", CSAs, by the phosphate industry"), including their existence as permanent barriers to terrestrial wildlife, and their perpetual management requirements, and other economic and environmental liabilities.
- Injuries and deaths associated with mining-related activities, or ancillary to the industry.
- Extensive loss of economically viable agricultural lands, and destruction of Hardee County's rural and agricultural heritage.
- Large-scale impairment and physical obstacles to west-central Florida transportation and future urban planning.
- Extensive secondary pollution via wide-scale contamination of surface waters and aquifers with phosphate chemical fertilizers, such as the well-documented contamination of groundwater along the Lake Wales Ridge which, in concert with other chemical contaminants, continues to be a growing economic and environmental liability.
- Degradation of regional aesthetics.
- Large-scale reduction of essential wilderness lands needed for non-game wildlife and ecologically-related recreational activities.
- The inappropriateness of allowing large-scale mitigation in exchange for the destruction of natural ecosystems.
- The inappropriateness of offsite mitigation in exchange for the destruction of natural on-site ecosystems, which represents a 100% net loss of habitat at the project sites.
- Loss of living space, water resources, and agricultural products which could provide for the support of hundreds of thousands of people, and probably more, as a result of future population growth.
- Loss of future jobs and tax bases due to loss of living space and water resource degradation.
- Historic loss of the potential for jobs, growth and development, and tax base due to phosphate land industry land ownership.
- The phosphate industries long history of effluent spills, chemical spills and releases, both large-scale and small-scale, into wetlands, waterways, soils, groundwater, air, and into the general environment, both locally and into other regions. These include, but are not limited to, discharges which travel down the Peace River, Myakka River, and Horse Creek towards Charlotte, Lee, and Sarasota counties on the Gulf Coast of Florida (as an example, see pictorial of the 2002 Homeland Spill beginning with Photo 1).

(a) "In late 1997 acidic process water from a phosphogypsum stack spilled into the Alafia (River), causing a massive fish kill and damage to the river's aquatic life and ecosystem."⁶
(b) Mid 2002- Homeland Mine Spill: Effluent Discharge into the Peace River, Polk County. Phosphate waste clay laden effluent discharged into the river for several days before an approximate 30-foot wide breach in an earthen dam/impoundment/containment could be repaired. The disaster was apparently caused by improper maintenance (abandonment) followed by the effects of heavy rains. The spill "silted" the Peace River for miles, fish were killed, and the floor of the adjacent wetland floodplain forest was silted with phosphate waste clay and other strip mining waste materials⁷



Except for the select few who have visited active/inactive phosphate strip mines, or have per chance flown over such devastated regions in a plane or helicopter, the general public has no conception as to the degree and magnitude of the impacts, permanency, or associated long-term liabilities and human health risks. The extensive alterations to the Florida landscape which have already occurred within the CFPD are among the most prominent collection of land disturbance features visible from space. 3PR has no doubt that the advertising conducted for the scoping meetings and the narratives, figures, and exhibits of the DAEIS, were/are inadequate to educate the general public concerning the magnitude and impacts of strip mining in west-central Florida. A very large effort, much broader in scope and intensity, should have been made to educate and engage the general public on the very profound issue of regional-scale phosphate strip mining. Involvement in the initial scoping meetings for the DAEIS was therefore unnecessarily selective and restrictive, and constitutes a general public injustice.

Although at least one scoping meeting reportedly hosted over 100 attendees, a large percentage of those present were, intrinsically, representatives of the phosphate industry and various assortments of government officials, agency personnel and assistants. The public has not been adequately noticed and

⁶ FIPR - <http://www.fipr.state.fl.us/about-fipr-general.htm>.

⁷ Hardee County Dept. of Planning Development, PowerPoint report to BOCC, 2-July 2002.

appropriately educated as to the extent, value, complexity, and irreplaceably of the natural resources which may be destroyed by continued phosphate mining. Neither have they been appropriately informed in clear terms, which are meaningful to laypersons, as to the vast array of regional and global consequences of destroying a large percentage of west-central Florida merely for the short-term economic gain of external interests.



The DAEIS focuses almost exclusively on fulfilling the primary economic strategy of the phosphate industry, which has been, and continues to be, to mine every available acre, without adequately protecting the irreplaceable subtropical ecosystems and extensive water resources which is destroys, and without assuming

responsibility for the long-term liabilities which fall on local communities. Phosphate strip mining provides the potential for far-reaching and pervasive impacts such as contamination of surface waters and groundwater, and generally elevated radiation levels. Avoided in the DAEIS are competent evaluations of ecological resources and forthright discussions and proposals for "*Protection of the Environment*" within the CFPD, which is the sole purpose of NEPA as set forth in 40 CFR 1500.1.

It is not possible to estimate the number of spills which have occurred within the CFPD, or the impacts they have had both internally on mine lands, and externally. Monitoring is lacking, and spills are seldom reported, even less often are they documented, or well-documented, as is the example in the previous three photos.

* Recommendation:

Comprehensive full time monitoring and auditing of phosphate strip mines (past and present) and its related industries is critically needed in order identify and evaluate spills and other discharges in a timely fashion. An analysis of the required staff, resources, and "independent" funding sources is needed.

DAEIS ERRONEOUS AND BIASED STATEMENTS

* Substantive Comment:

The DAEIS should be rewritten to contain only data and scientifically supported descriptions of environmental resources and potential impacts. Some representations made in the document, such as inferring that mining will actually improve the site, are erroneous and greatly erode the credibility of DAEIS. Additionally, a very significant body of valuable "independent" scientific research exists which is not utilized or appropriately cited in the DAEIS.

DAEIS NOT SCIENTIFICALLY QUALIFIED

* Substantive Comment:

3PR questions the adequacy of environmental analyses and accuracy of the information upon which the DAEIS was based, because seemingly little effort was expended in locating and utilizing regional environmental experts and regionally relevant biological and ecological research published by prominent institutions conducting research in conservation biology in central Florida, such as the Archbold Biological Station, the University of Central Florida, the Natural Resources Flight of the Avon Park Bombing Range, and Tall Timbers Research Station. NEPA requires that appropriate information be solicited from the public.

40 CFR 1506.6 Public Involvement

Agencies shall:

(d) Solicit appropriate information from the public.

At a minimum, the DAEIS should include a comprehensive literature search, reviews, and independent biological evaluations and characterizations of ecosystems, vegetative communities, and other biota which occur within the CFPD (Palmer et al 2005). Without comprehensive and competent information there can be no analysis, and therefore no cumulative impact study. A comprehensive cumulative impact assessment must be based on high levels of data and analyses, developed from research conducted within the project area

(CFPD) by independent, regionally-experienced, well-known, third-part scientists, plus a comprehensive and independent treatment of each important biological, wildlife, and ecosystem concern.

Instead of independent evaluations, the DAEIS relies very heavily on representations and analysis which appear to have been provided by the Applicants, phosphate industry agents, or other phosphate strip mining proponents such as The Phosphate Council. This is a conflict of interests.

The DAEIS and cumulative impact assessment should specifically include, but not be limited to, comprehensive evaluations and analyses conducted by scientists independent of the phosphate strip mining industry, which are based on site-specific data of:

- The cumulative and compound negative effects of permanently destroying tens-of-thousands of acres of native soils crucial for the production of traditional types of local crops and foods, which are indispensable for the continuance of economically viable and flexible traditional agriculture, and which are also essential for the existence of native regional ecosystems including native vegetation associations.
- The increased vulnerability to contamination of the IAS and FAS potentially caused by removal of the overlying SAS, and removal of the vital, irreparable, inscrutably complex and ecologically delicate upper soil layers and horizons, including, but not limited to, the spodic horizons of many dry prairie (flatwoods, pine-palmetto flatwoods) soils.
- The destruction of thousands of acres of native wildlife habitat.
- Increased Radium-226 and other radiological contamination in birds and other biota.
- Destruction of thousands of acres of diverse, complex natural wetlands and waterfowl habitat, and attempting to replace such with biologically and hydrologically inferior reclaimed (artificial) wetlands which are "out of ecological context", and therefore lack natural ecological connections and interaction with elements of upland/wetland ecosystems.
- Regionally altering surface and groundwater flows.
- Creating tens of thousands of acres of surface disturbance and altering soils, resulting in large-scale ruderal conditions that promote endless and permanent infestations of noxious weeds and/or undesirable species, or disproportionate concentrations thereof, such as cogongrass, which are very difficult and massively expensive to eradicate.
- Greatly increased evaporation loss potentially relating to the extensive areas of open water associated with clay waste disposal and settling/storage areas (CSAs), dewatering processes, water management, and exposed surface waters in mine pits.
- Potentially excessive use and degradation of groundwater during the mining process.
- The effects of ore processing reagents contained in sand tailing and waste clays which are disposed of, or used in, reclamation.
- Climatic change which may result from regional deforestation and re-contoured, hydrologically altered, essentially treeless landscapes of many reclaimed lands.
- Potential health and environmental risks associated with increased radiation, dust from unconsolidated, de-vegetated ground, and other environmental contaminants associated with the intensive operations of heavy industry.
- Long-term aesthetic degradation.

The DAEIS lacks specificity and measurability throughout, and is general unqualified because of inadequate, non-regionally-specific data and analyses, and "preparers" who lack adequate experience with the ecosystem and biota of west-central Florida. It does not provide adequate evaluations, conducted by objective, politically neutral third-party researchers, of the vast and irreplaceable natural resources proposed to be destroyed by mining.

INADEQUATE PUBLIC NOTICE AND EDUCATION

* Substantive Comment:

3PR questions the adequacy of the DAEIS development processes, because it did not adequately solicit for public input and participation. Regionally recognized, "independent" biological and conservation research institutions and wildlife experts were not sought out for assistance or consulted. Its meetings were not widely advertised in ways that would adequately, accurately, and appropriately characterize and stress the tremendous scope and importance of the proposal, and its potential for long-term negative impacts to human society and the environment. Public notices and advertising did not adequately or appropriately characterize phosphate strip mining and its demonstrated potential for diverse negative impacts to the environment and human society. Additionally, the DAEIS development efforts did not adequately inform the public, with concise descriptions, photos, and through multimedia, TV, and broad Internet advertising, which are the "media of today", as to the condition of previously mined properties. There was no reasonable effort made to inform the general public concerning phosphate strip mining, to depict or characterize their operations and activities, or make them aware of the condition, or uses, or other important issues relating to previously mined lands. An effective and comprehensive educational process is therefore essential in order for the general public is to gain a reasonable level of understanding, and conceptualize the magnitude and potential for negative impacts which phosphate strip mining will have on their communities. Tours of the landscape surrounding Mulberry and Ft. Meade, and the phosphate industrial processing district along SR-60 between Bartow and Mulberry would be very educational.

The DAEIS scoping meeting with the largest turnout reportedly had a significant number of attendees, most of whom were representatives of the phosphate industry or government personnel. Those with the greatest vested interests will always ensure that they are overrepresented. Meetings merely involving small developments, public parks, and local issues often generate much more involvement solely by newspaper advertising. Although the DAEIS and proposed mining operations will result in impacts to tens-of-thousands of acres, involving 6 counties, and 2 watersheds (which include an additional 2 counties), only very limited advertising was provided to the public, and with virtually no "real" characterization of the extreme scale of the proposed projects and magnitude of impacts to the environment and human society.

SCOPE AND DETAIL OF DAEIS INSUFFICIENT

* Substantive Comment:

As detailed in 3PR's other comments herein, the DAEIS is highly insufficient in scope: (1) in terms of evaluations of ecosystems and biota including the cumulative effects of ecosystem destruction, in terms of Environmental Justice, in terms of omission of data, analyses, documentation, and consideration of potentially important public and environmental health concerns relating to increased radiation, omission of analyses, documentation, and consideration of wide-spread negative impacts of noxious and weedy, or non-native vegetation.

The DAEIS states *"The USACE's decision will be to either issue, issue with modifications, or deny Department of the Army permits for the proposed actions. The Draft AEIS (DAEIS) is intended to be*

1418 *sufficient in scope to address federal, state, and local requirements and environmental issues*
1419 *concerning the Proposed Action and permit reviews."*
1420

1421 3PR demonstrates throughout its comments that the DAEIS is inadequate and not sufficient in scope,
1422 in terms of its site-specific data and analyses, and in consideration of the fact that state and local requirements
1423 and environmental issues are omitted or all but ignored.
1424

1425 DAEIS PREDETERMINES APPROVAL THROUGHOUT

1426 * Substantive Comment:

1427 Of 5,000 comments, the USCOE listed 4 "primary" issues, and 11 "other" issues. Most of these issues
1428 are general. The first issue, *"Ecological resources, including the loss of wetlands and mitigation of such*
1429 *losses"*, should be restated so that its meaning is clear. It should not presume "losses" or the "mitigation of such
1430 losses". 3PR questions the accuracy of the information in the DAEIS, because this important issue is
1431 inappropriately combined with the entirely separate issue of "mitigation".

1432 Refer to other 3PR comments in regard to the USCOE excessively relying on the Applicants,
1433 associated entities, and paid consultants for DAEIS content, and the predetermination of permit and mining
1434 approval which permeates the document.

1435 * Recommendation:

1436 3PR recommends that the first issue, *"Ecological resources, including the loss of wetlands and*
1437 *mitigation of such losses*, be bifurcated into two issues: (1) *"Large-scale and cumulative loss of ecological*
1438 *resources and wetlands"*; and (2) *"Potential for mitigation of environmental impacts"*.
1439

1440 INAPPROPRIATE DAEIS CONTENT / MINING EFFICIENCY ADVANCES

1441 * Substantive Comment:

1442 3PR questions the need for much of the *pro forma* information and bulk contained within the DAEIS,
1443 because, as previously established, it is not consistent with NEPA. Many sections, such as this one, do not
1444 further the understanding of the impacts of phosphate strip mining. Even so, improvements in phosphate strip
1445 mining technologies have merely increased the destructiveness of mining by more completely obliterating
1446 native ecosystems, and by producing vastly more waste clays and other environmentally unfriendly results, as
1447 the industry has become more "efficient" in extracting its products. Before "Technological Developments", the
1448 remaining, often parallel mine cuts, with overburden between, left some land which could be utilized for
1449 residential/commercial. Many homes have been built on such properties just south of Lakeland. However, the
1450 massive waste clay containment facilities now so prevalent in the core of the CFPD, which have resulted from
1451 so-called "Technological Developments" in phosphate processing, have precluded residential and commercial
1452 land uses over large areas of west-central Florida, and the many thousands of acres of new (planned) CSAs will
1453 continue to preclude valuable growth and economic development far into the future.

1454 * Recommendation:

1455 Comprehensive studies need to be conducted in order to determine the amount of residential and
1456 commercial development which has occurred on phosphate lands (including on CSA's) which have been mined

during the last 20 years. The results of such studies will quickly reveal "true" economic and social potentials of properties in the post-mine post-reclamation scenario. Mine ownership precluded large areas of land from being developed during the recent economic boom. Likewise, future phosphate strip mining will continue to physically and environmentally obstruct residential and commercial growth in central Florida. See Hazen & Sawyer (2004).

INADEQUATE PUBLIC EDUCATION AND INVOLVEMENT

* Substantive Comment:

3PR questions the adequacy of the environmental analyses contained in the DAEIS, because the NEPA "Public Involvement" requirements were not fulfilled. This may represent a special concern because, as detailed in previous sections of 3PR's comments, significant areas within the CFPD fall into low-income and/or minority dominated categories, suggesting the need for special public involvement considerations. The areas of compliance in question include:

40 CFR 1506.6 Public involvement.

Agencies shall:

(b) ...In the case of an action with effects primarily of local concern the notice may include:

(v) Notice through other local media.

(vi) Notice to potentially interested community organizations including small business associations.

(vii) Publication in newsletters that may be expected to reach potentially interested persons.

(viii) Direct mailing to owners and occupants of nearby or affected property.

(d) Solicit appropriate information from the public.

3PR is not aware of the utilization of: the predominant television channels which are viewed locally within the CFPD, notices to churches within the CFPD, minority businesses and business associations within the CFPD, direct mailings to owners and occupants "nearby", but external to, the CFPD, or "affected" properties within or external to the CFPD.

The effects of area-wide phosphate strip mining extend far beyond the boundaries of the individual mine project, or the CFPD, and the public involvement process should have been much more greatly expanded and comprehensive. Again, low-income and minority populations, including non-English speaking, should be entitled to an especially strong effort to educate them as to the potential impacts of area-wide phosphate strip mining on the future of their communities, livelihoods, and futures. Proportionate to the amount of land utilized and impacted, phosphate strip mining creates very few fulltime jobs for Hardee County residents. Many of such jobs are merely temporary, as mining moves southward through the county. Because phosphate strip mining eliminates farmland, an important and much discussed concern recently debated in the Hardee County "Sustainable Hardee, Visioning for the Future" process (HCBOCC 2010), the large low-income and minority populations of Hardee County may be very significantly impacted by loss of employment.

RANGE OF ALTERNATIVES IMPROPER AND INCONSISTENT

* Substantive Comment:

3PR questions the adequacy of the environmental analyses in the DAEIS, because the presentation and discussion of alternatives is internally inconsistent and avoids certain considerations relating to cumulative impacts, and cumulative impact analysis. The analyses of the alternatives would be more logically conducted according to each class of alternative, as in: "No Action", proposed, foreseeable, and potential.

3PR primarily questions this section because, except for Alternative-1 ("No Action" / "no permit"), none of the alternatives significantly protect ecosystems, wetlands, water resources, soils, climate, geology, human environment, the rights of the majority of citizens, or the rights of future residents. The purpose of NEPA, which is "*Protection of the Environment*", the "*Congressional Declaration of Purpose*", which in part is to "*encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere*", and "Environmental Justice", which is necessary to protect those who are most certainly not able to well represent themselves, are nowhere adequately furthered in the DAEIS.

3PR questions Alternative-1 ("No Action" / "no permit") because, as discussed in a previous comment, this alternative potentially allows many of the most severe impacts of phosphate mining to continue with approval. This is inconsistent with the NEPA purpose of "*Protection of the Environment*".

3PR questions the validity and intent of the DAEIS as a tool which furthers the interests of mankind. The document presents voluminous amounts of generic data, including many excerpts from public documents, some of which is appropriate, most of which is either inappropriate or unnecessary.

3PR contends that "Alternative-1 ("No Mining") is the only acceptable alternative, because even this alternative will result in very extensive negative impacts through continued phosphate strip mining as the industry completes its permitted projects.

3PR questions the validity of all alternatives presented in the DAEIS because they very obviously were not developed objectively and openly in the public interest. The alternatives are not reasonable in terms of their total direct negative impacts on the environment and society, especially their potential impacts to low-income and minority communities.

AFFECTED ENVIRONMENT ANALYSIS GROSSLY INSUFFICIENT

* Substantive Comment:

3PR questions the adequacy of the environmental analyses in the DAEIS, because Chapter 3.0 "Affected Environment" is entirely inconsistent with the requirements of NEPA.

40 CFR 1502.15 Affected environment.

"The environmental impact statement shall succinctly describe the environment of the area(s) to be affected or created by the alternatives under consideration. The descriptions shall be no longer than is necessary to understand the effects of the alternatives. Data and analyses in a statement shall be commensurate with the importance of the impact, with less important material summarized, consolidated, or simply referenced. Agencies shall avoid useless bulk in statements and shall concentrate effort and attention on important issues. Verbose descriptions of the affected environment are themselves no measure of the adequacy of an environmental impact statement."

Nowhere is the "environment" of the CFPD or the four proposed phosphate strip mine projects "succinctly" described in ways which would allow a reviewer to "understand the effects of the alternatives". And, as detailed in the other comments of 3PR, the data and analyses are definitely not "commensurate with the importance of the impact".

As with all Chapters of the DAEIS, this section is difficult to follow and evaluate because of such erroneous statements as "The CFPD study area is characterized by prevailing flat terrain. Minimal aesthetic impact concerns are anticipated for any proposed new phosphate mines so long as adequate berms and setbacks or buffers are maintained." The CFPD contains most of the Polk Upland, which is largest upland physiographic province in central Florida, and is characterized as "uplands", "ridges" and "slopes". Positioned within this vast upland region, which has many broadly rolling hills, and riverine/palustrine valleys and ravines, are the even higher hills of the topographically contrasting Lakeland Ridge and Lake Henry Ridge, as well as several unnamed ridges and extensive, intermittent xeric upland areas, such as is found throughout western Manatee County, and along the banks of the Peace River and major creeks. A more appropriate statement for the DAEIS, which is "succinctly" accurate, would be "Phosphate strip mining destroys the historic aesthetic character of each community and region it mines by excavating the hills and valleys, and replacing them with new contours surrounding massively tall, geographically extensive, rectangular dams and impoundments containing inestimable volumes of waste clays." See Photo 6.

Much of DAEIS is composed mainly of "useless bulk" and its statements are generally inadequate and inappropriate in properly responding to NEPA requirement, because they do not responsibly characterize and evaluate the "Affected Environment" in a "succinct" manner. Also, they are very frequently contradictory.

SOILS ESSENTIAL TO NATIVE ECOSYSTEMS AND HYDROLOGY IGNORED

* Substantive Comment:

3PR questions the accuracy of information and adequacy of the environmental analyses in the DAEIS, because it does not consider that phosphate strip mining utterly destroys sensitive native soils, especially dry prairie soils, and replaces them with non-native substrates to which native vegetation and thus ecosystems are not adapted. This is a highly significant environmental issue not addressed in the DAEIS. The most important, and by far the most predominant natural (native) soils found on unmined phosphate-company-owned lands in Hardee County belong to the "poorly drained" drainage class, "B/D" hydrologic group (USDA 2012b). Because of very recent changes in the engineering criteria for hydrologic groups, extensive areas of B/D soils have been re-designated or redefined, as A/D hydrologic group. Both B/D and many A/D soils in Hardee County include the following types: Basinger fine sand, Bradenton loamy fine sand, Farmton fine sand, Felda fine sand - frequently flooded, Felda fine sand, Immokalee fine sand, Myakka fine sand, Pomona fine sand, Wauchula fine sand mapped by the NRCS. The crucial importance of protecting the integrity of these unique native soils, which are essential to mesic and seasonally wet native upland ecosystems, is discussed further in several other 3PR comments.

Phosphate strip mining extensively alters the physical, chemical, and hydrologic properties of surficial aquifers and water tables. It is well documented that native upland ecosystems and vegetative communities are

precisely adapted and require these special natural attributes (Orzell & Bridges 2006) (Cole et al 1994) (Huck 1987). Natural native ecosystems and their specific vegetative communities are therefore precluded from re-establishment after and as a result of the soil impacts caused by phosphate strip mining.

* Recommendation:

The effects of converting vast areas of native soils to unnatural post-mining Arents-Hydraquents-Neilhurst substrates, which cannot support native upland ecosystems, including "dry prairie, pine/palmetto flatwoods" vegetative communities, are devastating to the natural environment. These essential ecological assets must be thoroughly analyzed and assessed, providing special attention to the cumulative negative impacts which area-wide phosphate strip mining has imparted, and will impart, to the regional ecology, native biota, genetic diversity (genetic erosion), natural hydrology, and critical bio-hydrologic regimes of the Southwestern Florida Flatwoods Ecoregion. The aerial extent of each native soil type must be correlated to the amount of each native vegetative community lost. Each native vegetative community must be fully characterized as in Orzell & Bridges (2006), because little is known of ecosystem structure in the regions west of the Lake Wales Ridge, and because numerous plant species have been recently discovered in that region which were formerly unknown to science, and which are planned to be proposed for federal listing. Evaluations must be conducted for each alternative, and for lands which have already been mined, so that negative environmental impacts may be evaluated separately, and then cumulatively.

COORDINATION AND CONSISTENCY WITH LOCAL AGENCIES LACKING

Additionally, 3PR questions the adequacy of the environmental analyses and accuracy of the information in the DAEIS, because NEPA requires coordination and consistency with the laws and future planning strategies of state and local governments. The State of Florida Comprehensive Plan requires that.

Florida Statutes: 187.201(13)(b) Policy 5:

Prohibit resource extraction which will result in an adverse effect on environmentally sensitive areas of the state which cannot be restored.

As detailed elsewhere in 3PR's comments, throughout the DAEIS insufficient evidence of efforts to significantly coordinate with state and local agencies in terms of assuring consistency with their laws, regulations, and adopted land use or agency policy plans. In comparing the policies of the State Comprehensive Plan, Central Florida Regional Policy Plan, and Local Comprehensive Plans of the counties being impacted by phosphate strip mining, many inconsistencies and direct conflicts may be found. A few additional examples from the State Comprehensive Plan include:

State Comprehensive Plan

Florida Statutes: 187.201(5)(b)1 Goal: An environment which supports a healthy population and which does not cause illness.

Florida Statutes: 187.201(5)(b)1.2 Policy a: The state should assure a safe and healthful environment through monitoring and regulating activities which impact the quality of the state's air, water, and food.

Florida Statutes: 187.201(7)(a) Goal: Florida shall assure the availability of an adequate supply of water for all competing uses deemed reasonable and beneficial and shall

maintain the functions of natural systems and the overall present level of surface and ground water quality. Florida shall improve and restore the quality of waters not presently meeting water quality standards.

Florida Statutes: 187.201(7)(b) Policy 2: Identify and protect the functions of water recharge areas and provide incentives for their conservation.

Florida Statutes: 187.201(7)(b) Policy 4: Protect and use natural water systems in lieu of structural alternatives and restore modified systems.

Florida Statutes: 187.201(7)(b) Policy 5: Ensure that new development is compatible with existing local and regional water supplies.

Florida Statutes: 187.201(7)(b) Policy 6: Establish minimum seasonal flows and levels for surface watercourses with primary consideration given to the protection of natural resources, especially marine, estuarine, and aquatic ecosystems.

Florida Statutes: 187.201(7)(b) Policy 7: Discourage the channelization, diversion, or damming of natural riverine systems.

Florida Statutes: 187.201(7)(b) Policy 8: Encourage the development of a strict floodplain management program by state and local governments designed to preserve hydrologically significant wetlands and other natural floodplain features.

Florida Statutes: 187.201(7)(b) Policy 9: Protect aquifers from depletion and contamination through appropriate regulatory programs and through incentives.

Florida Statutes: 187.201(7)(b) Policy 10: Protect surface and groundwater quality and quantity in the state.

Florida Statutes: 187.201(7)(b) Policy 14: Reserve from use that water necessary to support essential nonwithdrawal demands, including navigation, recreation, and the protection of fish and wildlife.

Florida Statutes: 187.201(9)(a) Goal: Florida shall protect and acquire unique natural habitats and ecological systems, such as wetlands, tropical hardwood hammocks, palm hammocks, and virgin longleaf pine forests, and restore degraded natural systems to a functional condition.

Florida Statutes: 187.201(9)(b) Policy 1: Conserve forests, wetlands, fish, marine life, and wildlife to maintain their environmental, economic, aesthetic, and recreational values.

Florida Statutes: 187.201(9)(b) Policy 3: Prohibit the destruction of endangered species and protect their habitats.

Florida Statutes: 187.201(9)(b) Policy 7: Protect and restore the ecological functions of wetlands systems to ensure their long-term environmental, economic, and recreational value.

Florida Statutes: 187.201(13)(b) Policy 6: Minimize the effects of resource extraction upon ground and surface waters.

Florida Statutes: 187.201(13)(b) Policy 7: Protect human health from radiological or other adverse impacts associated with resource extraction.

Florida Statutes: 187.201(13)(b) Policy 8: Reduce the adverse impacts of waste disposal associated with resource extraction.

Florida Statutes: 187.201(22)(b) Policy 9: Conserve soil resources to maintain the economic value of land for agricultural pursuits and to prevent sedimentation in state waters. 187.201(22)(b) Policy 9: Conserve soil resources to maintain the economic value of land for agricultural pursuits and to prevent sedimentation in state waters.

There are very large numbers of state, regional, and local laws and regulations with which the provisions of the DAEIS are not consistent. 3PR also questions the degree to which the USCOE specially cooperated with local governments as required by NEPA.

WILDLIFE COMMENTS NOT RELEVANT OR REASONABLE

* Substantive Comment:

3PR questions the adequacy of the environmental analyses and the accuracy of the information in the DAEIS, because certain statements such as under 3.3.62 are not reasonable, irrelevant, and inappropriate. It is not reasonable or rational for the USCOE to compare "reclaimed" phosphate strip mines to the qualities of native Florida ecosystems. Improperly using excerpts from short-term, narrow studies to suggest that "reclaimed" phosphate strip mines are in any way comparable, or even partly mitigate for impacts to native ecosystems, is in no way defensible. Isolated artificial facades, demonstration projects which required great expense to create and/or maintain, and concentrations of wildlife which are temporarily (and unnaturally) attracted to water resources, where none existed before, are in no way indicative of a functioning or stable ecosystem, nor do they provide significant value. Such areas may actually represent hazards and risks to wildlife. Further, the area-wide destruction of native upland and wetland ecosystems by the phosphate strip mining industry results mainly in vast, seemingly endless regions of noxious weed infestations which also promote imbalances in animal life. 3PR objects to the out-of-context excerpts, and conjecture of paid industry consultants or contractors, which are all too often encountered in the DAEIS.

Plant and animal species are products of their respective natural environments and range of environments. Except for certain generalist species, most native (indigenous) plants and animals are utterly dependent on specific native ecosystems, or similar classes of native ecosystems. Some mammals and reptiles, and (naturally) many birds, are mobile, to varying degrees. Some generalists may utilize man-altered sites from time to time, especially when they are forced to do, or are abnormally attracted to do so, or when they happen through a vast region of destruction and have no other alternative. Some species may occasionally breed in non-native areas, even though this is not a natural behavior of their biology or ecology.

"By altering the character of the environment, human beings bring about changes in the behavior patterns of within and between species so that most species are unsuccessful. However, the few that are successful reproduce quickly sometimes in explosive fashion" (Rau & Wooten 1980). The animals which remain are pioneer-type animals that tolerate changes in food types, shelter, and have only limited relationships with other organisms.

Because their natural native habitat is being destroyed on a massive scale in neighboring areas by phosphate strip mining, and by other types of development, many species will be forced to move into any available land, natural or unnatural, which is not actively being mined.

Several important issues and concerns exist in relation to mined/reclaimed land. The natural ecosystems which are completely destroyed by mining, along with their highly specific and essential soils and geology, are replaced by rocky/marl/sand/clay/etc substrates (Arents-Hydraquents-Neilhurst). Because no indigenous plant species are adapted to these soils, there are no native ecosystems which can support the establishment of self-sustaining populations of animals, except for certain generalists, pest species such as rodents, and temporary or guest species. This unnatural situation introduces primary succession. *"Primary succession occurs in an area where life has not existed before, such as on bare rocks, tallus slopes (which are unconsolidated slopes, land slides, embankments, etc.), sand bars, and sand dunes"* (Rau & Wooten 1980). Lands impacted by phosphate strip mining and reclamation represent such "bare" lands and are therefore in a mode of primary succession. *"Secondary succession occurs on bare sites previously vegetated"* (Rau & Wooten 1980), but this assumes that unnatural changes to soils and geology have not occurred, and that such areas can be recolonized from intact external floral and faunal sources. Therefore, few, if any, native plant species naturally colonize these mined and reclaimed upland areas. Normally, native "pioneer species" would first colonize such areas. However, and quite the contrary in the case of phosphate lands, many such unnatural areas are immediately colonized by noxious plant species, weedy species, foreign species, and other undesirable plants which play little, if any normal ecological role in native ecosystems, or in ecosystem services, and typically provide few "real" resources to native wildlife. Some species, such as cogongrass, completely preclude the reintroduction of native plants, and the establishment of vegetative communities, and also present serious ongoing management and eradication liabilities.

The Environmental Impact Analysis Handbook (Rau & Wooten 1980), which is widely used by federal agencies as a guide for developing environmental impact statements (e.g., by the Bureau of Land Management), concludes that "Unfortunately, we are finding that some of our most complex environmental problems are the result of environmental and ecological backlash. As a general rule we find that artificial projects and technological additions lead to the simplification of natural systems. This reductionism results in losses in biological efficiency, diversity, balance, and self-sufficiency of the biological community, and concomitant increase in pest species of plants and animals as escapees and weeds (Rau & Wooten 1980). Much of phosphate strip mine reclamation fits this dismal characterization precisely, especially after a few years, or after a few years without maintenance, that is, "life support". "Managed" biological systems, including "reclaimed" lands, and systems infested with noxious or non-native species, represent the lowest level of biodiversity, genetic diversity, and ecosystem services. For all intents and purposes these areas are effectively extinct. (Naeem 1997)

"Alteration or removal of natural vegetation has been the primary cause of habitat destruction, reduction in native plants and animals, and species extinctions. Any proposed project that will alter or remove the native vegetation must consider the impacts ..." (Rau & Wooten 1980). The following represent some, but not all, of the significant adverse impacts and important issues identified by Rau & Wooten in relation to land clearing, draining and filling, changing watercourses, construction of dams and reservoirs, roads, and industrial use:

- Habitat destruction - ADVERSE
- Loss of shelter and food - ADVERSE

- Loss of native plants and animals - ADVERSE
- Reduced species diversity - ADVERSE
- Enhances site for invasion of noxious and weed plants and animals - ADVERSE
- Creates conditions suitable for rodent outbreaks - ADVERSE
- Increased edge effect - ADVERSE
- Loss of climax species (in the case of forested habitats) - ADVERSE
- Changes in migratory patterns of birds and wildlife - ADVERSE
- Interference with migratory routes or normal movement of animals (in the case of roads) - ADVERSE

3PR questions the adequacy of the environmental analyses and accuracy of the information in the DAEIS, because it does not provide "*accurate scientific analysis*", "*expert agency comments*", but relies disproportionately on representations made by the Applicants. Representations made by the Applicants intrinsically further their needs, and consequently do not fulfill the NEPA purpose of "*Protection of the Environment*".

3PR considers that the AEIS process has been inadequate in effectively soliciting, advertising, and recruiting the independent expert assistance and judgments which are necessary in order to ensure adequate "*public scrutiny*". NEPA requires that "*Agencies shall: Solicit appropriate information from the public*". The DAEIS is therefore not founded on "*decisions that are based on understanding of environmental consequences, and take actions that protect, restore, and enhance the environment.*" NEPA required that "*Environmental impact statements shall be concise, clear, and to the point, and shall be supported by evidence that agencies have made the necessary environmental analyses.*" Many sections of the DAEIS present no clear point, and are not measurable, or supported by data and analyses.

Even if the soils and geology of the natural ecosystems which phosphate mining destroys were preserved, local gene pools would have been destroyed by clearing away natural vegetative communities, thus creating severe regional genetic erosion, which causes essential adaptations (genes/genetics), which may have taken millennia to develop, to be permanently lost! Genetic erosion occurs because each individual organism has many unique genes which get lost when it dies without getting a chance to breed and reproduce. Genetic erosion is compounded and accelerated by habitat fragmentation. In Florida, even with considering the hundreds of thousands of acres of mined lands, the habitats of many plants and animals, including but not limited to listed species, live in smaller and smaller chunks of fragmented habitat, interspersed with human settlements and farmland, making it much more difficult to naturally interact with others of their kind for the purpose of reproduction, so many die off without getting a chance to reproduce at all, and thus are unable to pass on their unique, often regionally adapted genes to the living populations. Phosphate strip mining thus destroys genetic diversity and creates genetic erosion on a regional scale, possibly completely eliminating entire locally adapted plant genomes (landraces, locally adapted varieties, or ecotypes). It has been well established, that the only effective and self-sustaining species protection, which is actually gene pool protection, involves the protection and management of sufficiently large tracts of native ecosystems.

Also, because phosphate lands have been held in ownership for such long time periods, much (or the majority) of the surrounding ecosystems have already been eliminated by other types of development, such as, necessary agriculture, residential, and business/commercial uses. Therefore, as a result of phosphate strip

1793 mining, many of the last remaining locally adapted gene pools of important plant and animal populations, and
1794 even the genetics of entire metapopulations, will be greatly reduced, or possibly entirely lost. This represents a
1795 very serious, once in history, issue of regional concern, which has the potential to affect entire bioregions of
1796 west-central Florida, and even the biosphere. The dire consequences of this situation are that there will be no
1797 ecologically appropriate, regionally-adapted, adequately diverse, genetic sources which could be used for re-
1798 colonization or secondary succession, if such were even possible. "If the Earth has lost its savor, from where
1799 forth shall it be salted?" Even in this scenario, which is in no case attainable because phosphate strip mining
1800 eliminates or completely destroys the structures of most upland native soils and geology, especially the
1801 environmental unique, sensitive and complex flatwoods soils, the results are fatal to the continued existence of
1802 our very diverse and irreplaceable native flora and uniquely Florida ecosystems.

1803 3PR questions the adequacy of environmental analyses and accuracy of information in the DAEIS,
1804 because it neglects to consider the negative impacts and effects of phosphate strip mining on bio-diversity and
1805 the essential and necessary protection of genetic diversity within west-central Florida, and beyond (as these
1806 impacts affect surrounding regions and the biosphere). It does not consider the specific soil and geologic
1807 requirements of natural upland ecosystems.

1808 It is a widely known ecological principal, and an exceedingly common phenomenon, that disturbed
1809 areas, and newly inundated areas, promote the colonization and rapid reproduction of various wildlife due to the
1810 presences of artificially and temporarily expanded resources. These short-term increases include space, water,
1811 nutrients (some native uplands in central Florida are actually low-nutrient systems which are precisely adapted
1812 to very specific acidic soils), soil de-compaction and aeration, increased light, greatly reduced or entirely
1813 eliminated competition, and the concomitant explosion of insects, larva, sprouting seeds, and small and thaloid
1814 plants which provide additional plentiful food sources for larger species. Almost any flooded area will quickly
1815 acquire and produce large amounts of wildlife for a limited amount of time.

1816 Because the phosphate industry and related uses are almost continuously destroying ecosystems and
1817 creating pits, dams, vast enclosures of inundated waste clays, other wet areas, and creating the disturbed and
1818 somewhat alien substrates of open mine land, including "reclaimed land", which are often laden with nutrients
1819 and greatly differ in chemical and physical properties as compared to the soils required to support native
1820 ecosystems, ecological imbalances are continuously and dynamically taking place. These extreme impacts
1821 temporarily provide abnormal levels of "freed" resources. Because animals are forced into these areas from
1822 other regions of ecosystems being destroyed, and because animals flying over and moving through will seek out
1823 any available sustenance, active and recent phosphate mining continuously sponsors numerous examples of the
1824 unnatural, and environmentally unhealthy "population boom" phenomenon. A sudden or temporary abundance
1825 of certain types of wildlife, more than in natural systems, is invariably an indication of an ecological imbalance
1826 from a natural disaster, atypical event, or artificially induced problem. Therefore, the short-term bird and
1827 wildlife studies such as those cited here by the Applicants are irrelevant, and completely out of context from
1828 studies of mature systems, whether native or non-native. Ecosystems out of balance represent a concern. They
1829 are not an indication of ecological health.

Many mined lands eventually become overgrown with weedy and noxious plant species (such as cogongrass) and do not succeed to vegetative communities which experience natural or naturally compatible ecological succession. Such infested regions represent ecological and agricultural deserts. It would be very enlightening for the USCOE authors of the DAEIS to take broad and unrestrained tour of recently reclaimed and formerly reclaimed or abandoned phosphate lands.

The health and potential for long-term stability of the native environment is not measured based on mobile animal species, but on the diversity and stability of plant communities upon which they depend. Ecosystems are self-contained and self-maintaining. "*Natural ecosystems are invariably richer in species and more stable than those artificially developed, due to their many interdependencies and interrelationships*" (Rau & Wooten 1980). Such natural systems draw in life-supporting materials from great distances. However, in non-natural areas, which are artificial, the interdependencies are missing, and they are therefore not self-sustaining. Energy and materials are not recycled efficiently, and constant maintenance is required. Phosphate strip mining sites, including upland "reclamation" areas, represent more severe examples of being "artificial" because of extreme alterations to soils and geology.

Additionally, the primary vegetative cover of a very large number of acres of "reclaimed" phosphate strip mines is dominated by the invasive species cogongrass (*Imperata cylindrica*), which forms irrevocable monocultures over these vast ruderal landscapes. More thorough comments regarding cogongrass are presented in a separate comment.

RADIUM-226 IN BIRDS, WILDLIFE, AND PLANTS

* Substantive Comment:

3PR strongly objects and questions the accuracy of the information, the adequacy of the environmental analysis, and indeed the validity of the DAEIS, because of the fact that the well-known problem of generally elevated low-level radiation and the assimilation of Radium-226 in wildlife and plants is not treated with great concern. The scientific studies and publications of government, prestigious research institutions, universities, and others warn of this potential health and safety issue which faces the environment and human population alike. Even conservative authors caution that "*we assume that low doses also cause human health effects to a directly proportional, but smaller degree*" (FIPR 1986b).

Of great potential concern, and one of the largest potential problems with phosphate strip mining, is that birds are attracted to clay waste ponds, mine cuts, and wetlands created, either intentionally or unintentionally, on or near mined lands, or where discharges have taken place. Research suggests that these areas may act as a kind of radiation poisoning stations for wildlife, because the radioactive isotope Radium-226 (which reportedly has a half-life of 1601 years and decays into Radon-222, a radioactive gas) has been commonly shown to accumulate in the bones of fish and birds feeding in these areas, particular in the clay waste ponds referred to by the Applicants in this section. It was reported that "the average bone concentration in waterfowl from settling ponds in central Florida was about 4 times the recommended maximum for humans" (FIPR 1986a & 1986b). This issue is reinforced by additional research which concluded that "*As a result of mining and processing operations, most of the radioelements accumulate in the waste clays. Radium and*

thorium also are present in the gypsum stacks and uranium is present in the acid products and fertilizer" (FIPR 1985). Runoff and leachate from phosphate processing sources into ditches, wetlands, and other areas which may be utilized by plants, animals, or humans, may also be a concern as indicated by the conclusion that the EPA "... does not allow the use of central Florida gypsum. Material from central Florida generally contains about twenty-five pCi/g" (FIPR 1987).

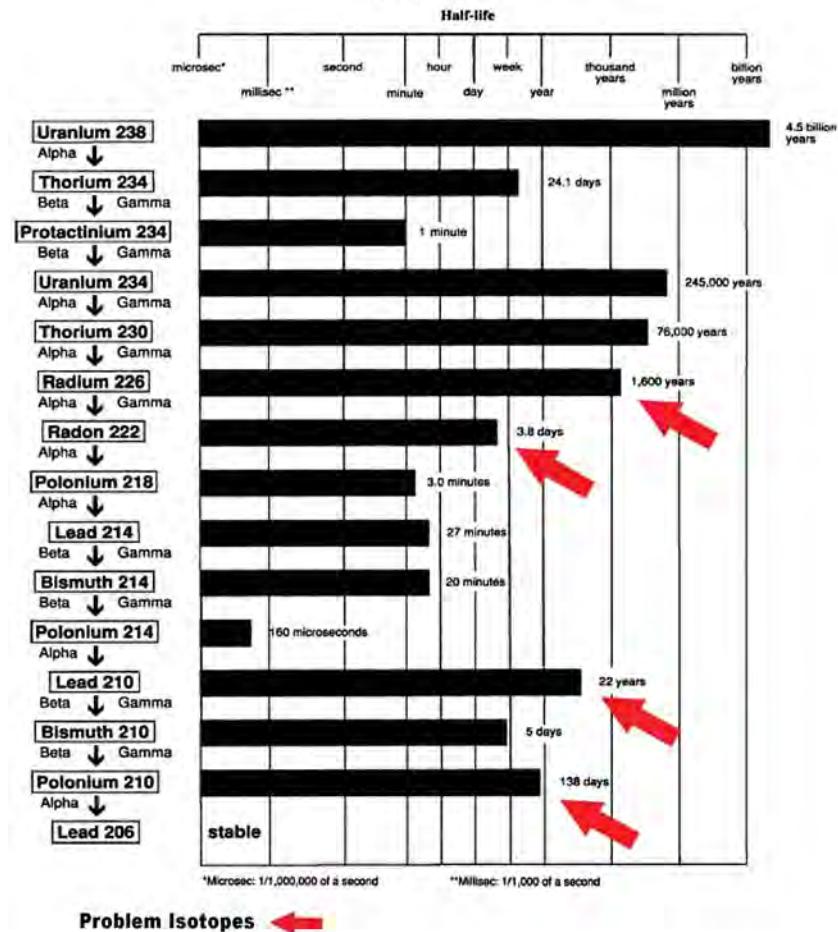
3PR questions the accuracy of information and the adequacy of environmental analyses in the DAEIS where elevated levels of low-level radiation are concerned, because nowhere is the mining-induced phenomenon low-level radiation treated with the proper concern, especially so considering the potential for such radiation to negatively impact human health, nor does it analyze these documented concerns in regard to overall "Protection of the Environment", which is the stated purpose of NEPA.

As for Radon-222, "When radon undergoes radioactive breakdown, it decays into other radioactive elements called radon daughters. Radon daughters are solids, not gases, and stick to surfaces such as dust particles in the air. If contaminated dust is inhaled, these particles can adhere to the airways of the lung. As these radioactive dust particles break down further, they release small bursts of energy which can damage lung tissue and therefore increase the risk of developing lung cancer. **In general, the risk increases as the level of radon and the length of exposure increases.**" (MASS 2012).



Table 2 shows the decay chain starting with Uranium-238. The chart is very helpful in understanding the relationships between the radioactive elements, their various isotopes and half lives.

Table 2



Additionally, there was not much permanent water at many of the sites prior to mining. This may greatly compound the issue of radium in birds, fish, aquatic plants, and other wildlife. It is also reported that radioactive isotopes travel with phosphate fertilizers and are taken up by tobacco and other agricultural plants (FIPR 1983). This may present a particular problem for other animals, including animals from distant regions, which consume such radioactive phosphate mine wildlife because they are attracted to the many wet and submerged areas resulting from the extensive excavations associated with mining. The apparent foundation of this problem is the accumulation of radiation in aquatic plants, especially small, thaloid, floating species eaten by water fowl, which grow quickly in the higher nutrient waters associated with mined lands.

The presence of such elevated concentrations of Radium-226 in wildlife, particularly in mobile wildlife such as birds, is potentially of great concern. Elevated radiation in the phosphate strip mining district in general, represents a very large and highly significant issue of contention which is not adequately addressed in the DAEIS. 3PR therefore questions the accuracy of information and adequacy of the environmental analysis in the DAEIS, because it does not consider this important health and safety issue which may have the potential to affect the human population and the precious and irreplaceable plants and animals of Florida. Additionally, this readily available research, as well as considerable other published research, is not cited in the Chapter 7 references of the DAEIS.

WATER RESOURCES

* Substantive Comment:

Throughout the DAEIS scientific data developed by the federal government, SWFWMD, and published in scientific journals is cited. Immediately afterwards erroneous or arbitrary statements are then presented by the Applicants (or from the industry perspective), presumably in refutation or rebuttal. However, either the statements made by the Applicants are unreferenced, or cite a letter or document from the phosphate industry, such as The Phosphate Council. The USCOE should not entertain conjecture and unqualified statements or information, or information from those with obvious or suspected conflicts of interests. For example:

Page 3-63 states: *"The case of Kissengen Springs is well documented. Kissengen Spring was a major spring which once contributed an average of 20 million gallons per day (mgd) of flow to the Peace River Basin in Polk County (Metz and Cimitile, 2010). USGS indicated that phosphate mining use of FAS wells for water supply was a contributing factor to the regional FAS drawdown that resulted in the cessation of flow from this spring (Metz and Lewelling, 2009)."*

Page 3-65 states: *"Garlanger (2002) estimated that groundwater pumping supporting phosphate mining contributed less than 10 percent of the drawdown that occurred at a particular affected spring (Kissengen Springs) and that other man-made withdrawals contributed to the rest of the effect."*

The fact that Kissengen Springs was destroyed by the phosphate strip mining industry is extremely well documented. At that time in history very few people lived at Bartow, and there were very few agricultural water users because irrigated agriculture was rare. Irrefutable evidence of this disaster remains to this day in the form of a legacy of utter environmental destruction along both banks of the Peace River from well above Bartow, through the defunct Kissengen Springs, south to Hardee County. USGS and SWFWMD publications indicate that the consumptive use of water from FAS greatly lowered the potentiometric surface and contributed to the formation of collapse sink holes along the Peace River which drain away much of the river's flow. Also, it was not only massive consumptive use which ruined Kissengen Springs, but the complete alteration of the surrounding surface water management system, SAS. It is also well documented that these impacts caused Kissengen Springs to fill in with clay. This is one of many prime examples illustrating how the phosphate strip mining industry has destroyed, or contributed to the destruction of resources which were hugely valuable to society. Today, Bartow is a very small town. It is the original county seat for Polk County, but because of phosphate strip mining early in its history, its growth was restricted and Lakeland became the county's major city. Mulberry, Ft. Meade, and now the City of Bowling Green has suffered an even a worse fate. Next in line will be the communities of Wauchula, Ona and Zolfo Springs.

* Recommendation:

The objectiveness, credibility and appropriateness of the comments and references which are included in an EIS, should be more carefully considered. One of the main problems with the DAEIS is that documentation/information is presented from government or scientific sources in one paragraph or on one page and then opposite statements are presented in/on the next which apparently emanate from industry-related sources. This is a recurring theme throughout the DAEIS. The USCOE should only include data, information,

and analyses to which it is willing to attest as being the best possible scientific evidence, and the most honest and objective (untainted) available! An Environmental Impact Statement is a very important instrument designed to guide the permitting of large projects ensuring "*Protection of the Environment*". The document should not be used as a platform for presenting debate or opposing arguments. Often, 3PR could not identify the position of the agency in relation to important issues. Usually, only discussion, data, and results are presented, but without an affirmative conclusion and agency accepted determination. NEPA requires that the information in the DAEIS be clear and succinct, and with the most credible scientific foundations. Very few sections of the DAEIS meet any of these criteria, or other NEPA requirements.

WATER QUALITY - NONPOINT POLLUTION

* Substantive Comment:

3PR questions the accuracy of the information and adequacy of the environmental analyses in the DAEIS, because it does not recognize the significance of the degree and extent of pollution generated by the phosphate strip mining, including, but not limited to, nonpoint pollution involving elevated phosphorous from runoff and spills, and from the use of chemical phosphate fertilizers for lawns, agriculture, golf courses, etc.

Nonpoint pollution is considered to "*the major source of water pollution in the U.S. today*". (Carpenter 1998). Eutrophication is currently the most widespread water quality problem in the country. Restoration of eutrophic water requires reduction in the contaminants. The most important barriers to the control of nonpoint nutrient pollution are social, political, and institutional.

IMPORTANCE OF UPPER SAS OMITTED: (HYDROLOGY OF NATIVE SOILS)

* Substantive Comment:

3PR questions the accuracy of the information and adequacy of the environmental analyses of the DAEIS, because significant issues relating to the SAS were not evaluated. All aquifers are impacted by phosphate strip mining, but the SAS is usually completely removed. Phosphate strip mining utterly disrupts natural geology and hydrology, removes native soils including their ecologically essential "unique" physical, chemical, and hydrologic properties, and replaces them with Arents-Hydraquents-Neilhurst substrates. These are unnatural wastes, overburden, or other unused substrates discarded as a result of phosphate strip mining and processing, and are documented to exhibit entirely different, and often environmentally extreme properties as compared to native soils (USDA. 1990; 2012a; 2012b). Other 3PR comments also address these issues.

Arents are moderately well drained to excessively well drained discarded overburden from the strip mining process, which exhibit a consistently alkaline pH. Hydraquents, called "slickens", are up to 85% clay and exhibit a high (alkaline) pH, and Neilhurst, which is excessively drained and usually composed mostly of sand with other inclusions. These unnatural substrates are intrinsically physically and chemically variable, and can be randomly homogeneous or heterogeneous in formulation. All are incompatible with the soils, hydrology, and ecology of native ecosystems, vegetation associations, and other natural systems.

In addition to creating landscape dominated by substrates which cannot support natural or diverse natural upland ecosystems, the removal or alteration of the SAS will also cause hydrologic changes, including

above and below ground alterations in flows and levels, that negatively impact all types of wetlands, including herbaceous marshes, bay heads and swamps, hardwood swamps, cypress swamps, seeps, etc. Man-made "reclaimed" wetlands seldom provide the same hydrologic functions as natural wetlands, exhibit altered hydroperiods, do not support equivalent species richness, often require continuous maintenance due to noxious or nuisance vegetation, are "out of context" with natural ecosystems, and are therefore of little ecological value. Such artificial systems may also present unusual environmental and physical risks to birds and other biota (as discussed elsewhere).

* Recommendation:

An integrated hydrologic model is needed in order to better determine the cumulative effects of phosphate strip mining on the flows of streams, runoff and surface flows, low-flow/base flows, and hydroperiods.

WETLANDS AND STREAMS NOT RESTORABLE

* Substantive Comment:

3PR questions the adequacy of the environmental analyses in the DAEIS, because it does not consider the irreplaceable values of natural wetlands systems, or the essential role of native soils relative to ecosystem function and hydrology. Evaluations of the important dynamics of surface water, groundwater and soil interaction are completely omitted. And, the DAEIS does not appropriately recognize and consider: (1) the regional (CFPD) and statewide cumulative impacts of area-wide destruction of entire classes of native wetlands, such as isolated wetlands; (2) the fact that wetlands systems are complex and have often taken hundred of years to develop, and that the phosphate industry does not have the technology (presuming it could exist), the resources, or the will to properly construct and manage, in perpetuity (or until stable and self-sustaining) many hundreds of isolated wetlands, miles of creeks, streams and tributaries; and, (3) that the processes required for wetlands to establish, stabilize, and begin to efficiently remove nutrients requires time — a long time in the case of forested wetlands.

The phosphate industry's track record of restoring the environment is dismal. In most phosphate strip mining operations the natural SAS is completely or mostly removed. The surficial aquifer system is the unconsolidated zone or strata, important in formation of seepage slopes and seep springs in Florida, generally of little or limited interest to most hydrologists due to small discharge or diffuse nature of seepage, but valuable to the residents of rural areas such as Hardee, DeSoto, and western Manatee counties, because they use the SAS as their primary source of drinking water, household water, and often irrigation water. There are many unanswered public health questions, both chemically and radiological, having to do with drinking and using water from shallow wells located on or near land formerly strip mined. There are also unanswered questions regarding the economic impact of mitigating these concerns, especially in low-income and minority communities which are present in these regions.

* Recommendation:

An independent scientific committee should be established to comprehensively and exhaustively evaluate the impacts which phosphate strip mining causes, and has caused, to native soils, natural aquifers,

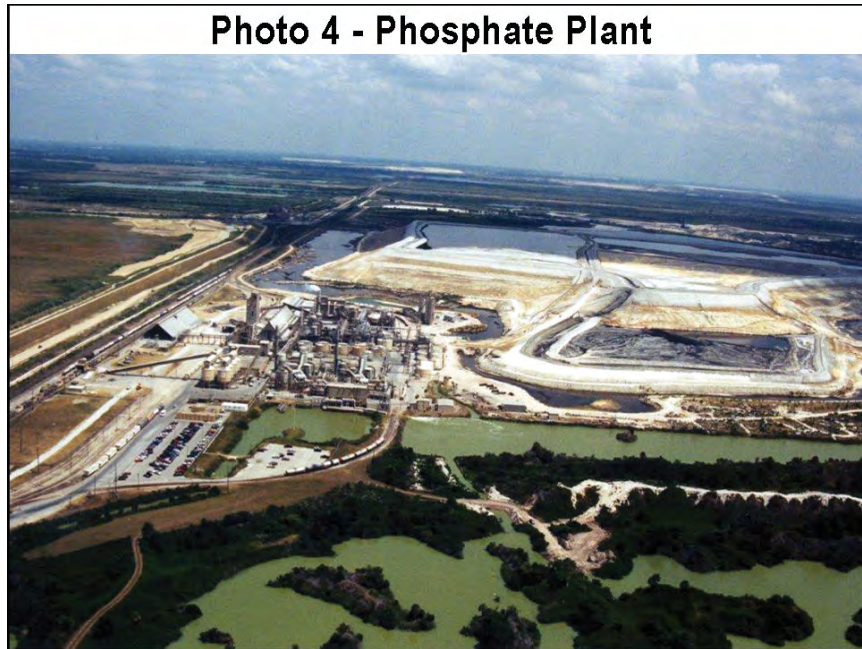
wetlands, and native ecosystems. Nowhere in the DAEIS are these impacts or natural resources properly evaluated, cumulatively evaluated, or their values genuinely considered as is required by NEPA in its single legally authorized mission and "*Basic National Charter*" of "*Protection of the Environment*". The protection of ecosystems is essential for the protection of all aspects of Florida's precious water resources, and for the protection public health and society.

WELLS IMPACTED BY MINING

* Substantive Comment:

3PR questions the accuracy of the information and the adequacy of environmental analyses in the DAEIS, because there is insufficient discussion of wells on and near phosphate strip mines. A highly significant issue is that existing wells are not analyzed, discussed, or even identified in the DAEIS. Local residents near phosphate strip mining areas sometimes complain of "dry" wells.

Photo 4 - Phosphate Plant



* Recommendation:

The DAEIS should very comprehensively analyze all aspects of the existing and potential negative impacts which wells and well water withdrawals have on local and regional water resources. Data and analyses are for the question of: (1) the effects of excessive consumptive use (2) the enhanced potential for aquifer contamination (particularly the surficial and intermediate aquifers) via well transport and induced recharge from major geologic alterations; (3) the physical and hydrologic alteration of aquifers which impedes or alters their natural functions and negatively impacts dependent biotic systems; (4) the economic impacts associated with mitigating aquifer damage, and; (5) the contamination or other alteration of aquifers which contribute to public health concerns.

WATER DEMANDS VERSUS WETLAND HYDROLOGY AND ECOLOGY

* Substantive Comment:

3PR questions the validity of certain combinations of alternatives presented in the DAEIS, because some combinations of alternatives appear to allow 50 to 80 or more miles of stream alteration (difficult to precisely determine), which would be potentially devastating to the regional environment and water resources, including external impacts to the "downstream" jurisdictions of Charlotte, Lee and Sarasota counties. The vast majority of Florida's population lives near the coasts. Coastal areas rely to great extent on inland sources of water. As sea levels rapidly rise for the next 50 years due to global warming, brackish invasion and saltwater intrusion will increase, and coastal populations will simultaneously be retreating inland and increasing in density. The spring of 2012 reported record high temperatures. Winters are getting much warmer, and evapotranspiration rates are increasing concomitantly, disproportionately so because considerable herbaceous vegetation does not die back and continues transpiration as central Florida winters, on average, become warmer and warmer. The natural water resources of the CFPD are thus needed in order to support future increases in human occupation, and therefore must not be destroyed or degraded by phosphate strip mining.

Mining requires the use of vast volumes of water. Mined lands greatly alter surface water management systems, and create many large open bodies of water which lose moisture much more quickly than native ecosystems and other pre-mine land covers. Such open water typically exhibits the highest evaporation rate of all land covers (Table 3), and especially large areas of water pigmented with fines. These and other hydrologic impacts of phosphate strip mining are hugely important concerns to human occupation in west-central Florida and southwest Florida. The concerns are not appropriately considered in the DAEIS.

The DAEIS does not provide analysis of dry-season and wet-season meteorological/hydrologic cycles and influences which are all-important factors in modeling and predicting hydrologic systems, nor does it thoroughly evaluate La niña - El niña cycles, or factor in the projected effects and impacts of global warming on weather patterns, severity of storms including increased potential for floods and high winds, increased evapotranspiration rates, particularly in the winter, and other predicted impacts.

The Peace River Manasota Regional Water Supply Authority (PRMRWSA) possesses a high level of regional scientific expertise in managing water resources. They are also the single most important agency providing water to several large populations in southwest central Florida. Although the PRMRWSA was referenced in several sections of the DAEIS, it does not appear as though adequate involvement has not been solicited from this agency. NEPA requires appropriate information be solicited from the public. Certainly the PRMRWSA possess relevant information, data, and analyses which should have been more thoroughly considered in formulating the DAEIS where potential impacts to the water resources of south-central Florida (Charlotte, DeSoto, Lee and Sarasota counties) are concerned.

WATER USE, "DOWNSTREAM" USERS, AND CHARLOTTE HARBOR

* Substantive Comment:

3PR questions the adequacy of the environmental analyses in the DAEIS, because nowhere are the total water uses and water availability impacts of phosphate strip mining analyzed for the purposes ensuring

that the need for new public water sources will not be created. Photos 4, 5, and 6 communicate a genuine level of concern where phosphate strip mining has the ability to interfere with runoff, recharge, storage, evapotranspiration, low flow, and climate. Of great concern is that the Applicants are proposing to use models and massive-scale engineering to control the flows of rivers, creeks, and tributaries. The implementation of these elaborate artificial systems will require continuous maintenance and, as a consequence, the natural ability of watersheds to deliver water to man and the environment will be greatly altered. Whereas, before mining, these systems were self-sustaining and auto-regulating, they were much more predictable and not subject to human error, miscalculation or abandonment. Most affected by these region-wide hydrologic, geologic, and ecological modifications, will be the "downstream" counties of Charlotte, Lee, and Sarasota counties. The water supplies of these downstream users will become "artificially" controlled by upstream interests.

Not only is there a great environmental cost to disrupting the water resources of an entire region, but an ongoing and tremendous economic cost, much of which falls on the taxpayers, or those who inherit unforeseen or miscalculated problems. Intrinsically, based on the existing approved mine permits, the current four proposals, and future proposals, which will no doubt involve more extensive mining further south, these problems will be inherited by the same "downstream" jurisdictions. Any problems or interruptions in water supply or decreases in water quality will inherently affect these counties disproportionately because they support the greatest human populations. That is, Charlotte, Lee and Sarasota counties have the greatest need for water now, and will have an ever-increasing need for stable water supplies in the future. Further, man-made systems, especially those involving thousands of potentially large-scale risks, as in for spills and discharges, or interruptions of water flows, or excessive increases in flows, are much more subject to failure from natural and man-made disasters.

3PR questions the adequacy of the environmental analyses in the DAEIS, because many of the aforementioned significant issues and risks have not been properly assessed, and therefore have the potential to negatively affect water quantity and quality for a very large region of west-central Florida, as well as adjacent "downstream" counties, thereby endangering reliable sustainability of human society and the environment. Conspicuously absent from the DAEIS are data and analyses which demonstrate that the phosphate industry possesses the resources, ability, planning, and will to respond to natural, man-made, and accidental disasters, or engineering miscalculations. Also obvious is that many data and analyses avoid addressing "worst case" scenarios. The Alafia River spill, Peace River at Homeland spill, Archie Creek spill, White Springs spill, and many other incidents would indicate otherwise.

* Recommendation:

Significantly more definitive and comprehensive analyses are needed in order to quantify the total water resource impacts of the proposed phosphate strip mines, including a full historical review of water use and water resource impacts already caused by mining within the CFPD. Because surface water, aquifers and ground water, and water quality are directly related, these entities should not be analyzed entirely separately, and as such cannot effectively be discussed separately. The needed area-wide studies should include a cumulative analysis of all historical water-related impacts. This is necessary in order to provide adequate understanding of the full environmental consequences of phosphate strip mining on water resources, both

within the CFPD, and to external regions, including "downstream" coastal counties. Elements of the studies should include "independent" evaluations of water quality, quantity, and the distribution of water availability for human use and for the environment, including, but not limited to, analysis of: consumptive use, increased evapotranspiration rates, the effects of the removal of native soils and ecosystems, the effects of re-contouring and alteration of surface water management systems, spills and discharges, FAS impacts, IAS impacts, SAS impacts, wetland hydroperiod, flows and levels of rivers and streams, dams and impoundments including CSAs and the creation of new open water or inundated areas. These studies must be conducted with factoring for all aspects of global warming impacts, including atmospheric, hydrologic, ecologic and human cultural/social/economic. None of these issues are treated adequately in the DAEIS. The DAEIS does not provide adequate analyses to make important decisions regarding the water impacts imparted by tens-of-thousands of acres of new phosphate strip mining.

The foreground in Photo 5 below represent a very small fraction (about 1/4000th) of what has already been phosphate strip mined in west-central Florida. It portrays a very bleak future indeed, and is obviously incompatible with the "real" future needs of society.



MINING'S HISTORY OF SPILLS, DISCHARGES, AND POLLUTION.

* Substantive Comment:

3PR questions the adequacy of the environmental analyses in the DAEIS, because it does not consider the phosphate industries history of accidental discharges and their inability to control them once they occur, as was the case with several known major spills, and an inestimable number of "unknown" spills may not have been recorded due to the lack of adequate monitoring/auditing of the vast expanses of mined land and ancillary or secondary industry. See Photos 1 and 2.

2145 Leaking, seeping, discharges of effluents from mined lands are common, and are an ongoing problem
2146 with such massively altered landscapes as are created by the phosphate strip mining industry and its ancillary (or
2147 secondary, tertiary) industries. As commented earlier, large spills also occur, often continuing for extended
2148 periods before detected or controlled. The primary problems relate to the degree to which landscapes have been
2149 altered, the disposal of large volumes of waste clays and other discarded materials (sand, overburden, etc), and
2150 the problem of monitoring and auditing such vast, often difficult to access, expanses of property. See Photos 4,
2151 5, and 6. At phosphate mines and mined land, the term "spill" is typically used in the context of pollutants or
2152 unwanted substances leaving mines or mined land. However, due to the post-mining condition of some mined
2153 properties, spills which occur internally may not be considered noteworthy. Of additional concern is the
2154 disposal of phosphogypsum and the potential for continued water quality degradation as a consequence of their
2155 closure and effective abandonment.

2156 * Recommendation:

2157 (1) A comprehensive investigation and evaluation of the phosphate industry's history and record in
2158 relation to accidental discharges of effluents and other potential pollutants into surface waters, wetlands, and
2159 aquifers is critically needed. (2) Evaluate the history and ability of enforcing agencies to satisfactorily monitor
2160 and detect such discharges. (3) Conduct research to evaluate any long-term liabilities associated with
2161 phosphogypsum disposal and "gyp stack" closure in relation to impacts to water quality. (4) Conduct a survey
2162 of current and past phosphate strip mines to locate ongoing discharges into internal ecological areas, and to
2163 offsite properties, including ditches, drains, canals, and conveyances on road right-of-ways which drain into
2164 wetlands, rivers, streams, or other offsite areas. Review Photos 1 through 6, to understand a fraction of
2165 potential problems which can in no way be expressed in words!

2166 Photo 6 below depicts a waste clay disposal site (CSA) (or other massive containment) of which there
2167 are a great many already occupying the west-central Florida landscape. Many phosphate strip mining impacts
2168 represent effectively permanent liabilities to the environment and create effectively immovable barriers to an
2169 expanding human society which has diverse needs for space, potable water, green space, safe recreation, and a
2170 clean and healthy natural environment.

Photo 6 - Clay Waste Dam (CSA)



PROCESSING REAGENTS ("CHEMICALS") IN THE ENVIRONMENT

* Substantive Comment:

3PR questions the adequacy of the environmental analyses and the accuracy of information because the highly significant issue concerning the use of "reagents" in phosphate strip mining product processing is not adequately investigated. Also, the available research is mostly "not" independent. It is reasonable that some or all of these reagents, because of their chemical properties, would impact water quality, affect the functions of the physical environment, and negatively impact ecosystems and biota. A study involving the "fate and consequences" (FIPR 2001b, quotes below) of such reagents reported that:

"Florida phosphate operations produce roughly 20 million tons of concentrate each year. Therefore, all of the reagents listed above are used in millions of pounds annually. These reagents are generally considered harmless to the environment for three reasons: (1) many of the organic chemicals are biodegradable, (2) some portion of the reagents remain on the rock surface and ultimately end up in the solid fertilizer products, and (3) the acids and bases neutralize each other in the process of water recycling.

"Major reagents associated with phosphate beneficiation include the following: fatty acid (used as a phosphate collector in the rougher flotation step), amine (as a sand collector in the cleaner flotation step), fuel oil (as an extender), sodium silicate (as a sand depressant), soda ash or ammonia (as a pH modifier), and sulfuric acid (for washing away the collector on the rougher concentrate). Typical plant consumption of the various reagents is shown below:"

Reagent Usage	Lb/Ton Concentrate
<i>Fatty Acid</i>	<i>4 - 6</i>
<i>Fuel Oil</i>	<i>4 - 10</i>
<i>Amine</i>	<i>1.5 - 2</i>
<i>Soda Ash</i>	<i>4 - 6</i>
<i>Sulfuric Acid</i>	<i>6 - 8</i>
<i>Sodium Silicate</i>	<i>1 - 1.5</i>

Using the table above and the "20 million tons of concentrate each year" estimate provided in the research, the annual use of the reagents would be projected as follows:

Reagent Used	Min Lbs/ Yr	Max Lbs/ Yr	Min Tons/ Yr	Max Tons/ Yr
Fatty Acid	80,000,000	120,000,000	40,000	60,000
Fuel Oil	80,000,000	200,000,000	40,000	100,000
Amine	30,000,000	40,000,000	15,000	20,000
Soda Ash	80,000,000	120,000,000	40,000	60,000
Sulfuric Acid	120,000,000	160,000,000	60,000	80,000
Sodium Silicate	20,000,000	30,000,000	10,000	15,000

In the case of Fuel Oil, this estimate appears incredibly conservative, because in a later paper, published 2008, it was stated that "*The Florida phosphate industry consumes about 150 million tons a year of fuel oil in the forms of No.5 oil or kerosene*" (FIPR 2008b). That's 150,000,000 "Tons" not "Pounds (Lbs)" ! Possibly this is an error of some sort, because the magnitude of the latter value seems inconceivable? Several FIPR papers focus on the need to reduce consumption of reagents in order to reduce concentrate production costs. However, the use of such reagents appears to be increasing.

* Recommendation:

The phosphate strip mining industry uses various reagents which are employed to separate "matrix" components and more efficiently refine and obtain "concentrated" products. What substances are currently being used? Where have they been used? When and in what amounts they are used? Where do they end up? These questions have not been fully answered, especially not in ecological terms. Overall, the full range of potential negative impacts from the large-scale use of reagents has not been satisfactorily established. It is not rational to consider that 150-million tons of fuel oil placed into the environment is "harmless" (FIPR 2001b).

Number 5 fuel oil is a residual-type industrial heating oil requiring preheating to 170 – 220 °F (77 – 104 °C) for proper atomization at the burners. This fuel is sometimes known as Bunker B. It may be obtained from the heavy gas oil cut, or it may be a blend of residual oil with enough number 2 oil to adjust viscosity until it can be pumped without preheating (http://en.wikipedia.org/wiki/Fuel_oil).

Kerosene, a thin, clear liquid formed from hydrocarbons, with a density of 0.78–0.81 g/cm³, is obtained from the fractional distillation of petroleum between 150 °C and 275 °C, resulting in a mixture of carbon chains that typically contain between six and 16 carbon atoms per molecule. Major constituents of Kerosene include n-dodecane, alkyl benzenes, and naphthalene and its derivatives (<http://en.wikipedia.org/wiki/Kerosene>).

Comprehensive "independent" studies are immediately needed in order to determine the direct and cumulative impacts of releasing vast quantities of "reagents" into the environment, and potentially into products as indicated in FIPR (2001b). It may be logical to assume that the "reagents" are not highly purified individual chemicals and are actually composed of multiple chemical substances. The main classes of "reagents" may, in fact, vary in their chemical composition, and vary in consistency from time to time? Possibly some or all of these reagents represent the wastes of other industries? In order to provide the proper assurances which NEPA guarantees, including "*Protection of the Environment*" and to ensure that federal EIS actions are not

2233 "unsatisfactory from the standpoint of public health or welfare or environmental quality", the important issue of
2234 reagent use should be much more comprehensively investigated, scientifically scrutinized, and reported upon.
2235



2236 2237 2238 PLANT AND ANIMAL RELOCATION AND MITIGATION IN GENERAL

2239 * Substantive Comment:

2240 3PR questions the merits and the validity of relocating plants and animals as a conservation or
2241 mitigation strategy and disagrees that mitigation or relocating is a reasonable alternative for native ecosystem
2242 protection, or that it provides any significant conservation benefits. This is a significant issue. Vast amounts of
2243 Florida's native ecosystem have been destroyed in exchange for various forms of mitigation which often fail.

2244 The "reclamation" merely implies the "taking back of land". The term does not include "ecological
2245 restoration", individual "habitat restoration", or even "vegetative community restoration". Herein lies the
2246 problem with the concept of "mitigation", which is merely a "lessening of impacts" ... as interpreted for a
2247 particular need or point of view. 3PR cites many important scientific facts as to why replicating or even
2248 simulating native vegetative communities or even ecosystems is impractical and usually doomed to a rapid
2249 failure. 3PR also cites instances and arguments as to why such attempts may even be detrimental to wildlife.
2250 All debate set aside, the essences of the problem is that mined land is mostly unsuitable to support native
2251 ecosystems and biota, especially where upland vegetative communities and ecosystems are involved. Even
2252 where some minor facades of native vegetation are created, and do persist. The do so at great expense and
2253 usually with on-going maintenance. In the short-term, and in the long-term, biodiversity is lacking in
2254 "reclaimed" area and mined lands, even after long periods of time. Genetic diversity is lacking (although if the
2255 original gene pool were present it would not be relevant to the unnatural environment of mined lands), and
2256 ecosystem interaction and context are lacking because of large-scale ecosystem destruction, and because
2257 creating vast ecological gaps and fragmentations of the remaining areas. Essentially, the best results of

"reclamation", "restoration", and on-site or off-site "mitigation" may be considered **"managed ecosystems"**.
"Best results" meaning created systems which establish and support a self-sustaining, self-maintaining, reasonable dominance of desirable native plant and animal species.

"Unprecedented changes are taking place in the ecosystems of the world, including species losses through local extinctions, species additions through biological invasions, and wholesale changes in ecosystems that follow transformation of wildlands into managed ecosystems. These changes have a number of important effects on ecosystem processes. Recent evidence demonstrates that both the magnitude and stability of ecosystem functioning are likely to be significantly altered by declines in local diversity, especially when diversity reaches the low levels typical of managed ecosystems. Although a number of uncertainties remain, the importance of ecosystem services to human welfare requires that we adopt the prudent strategy of preserving biodiversity in order to safeguard ecosystem processes vital to society." (Naeem 1999)

Essentially, "reclamation", much of which involves and is considered to be "mitigation", in best case scenario, results in systems which would require high levels of maintenance to maintain their facsimile appearance. As for other large areas, cogongrass, weeds, non-native species, and other undesirable biota or biological/ecological characteristics become serious problems.

It is well documented that most listed plant species, because they are usually also "endemic" plant species, have very precise environmental requirements, and are found only in specialized native vegetative communities or associations within certain ecosystems (Orzell & Bridges 2006) (Cole et al 1994) (Huck 1987). The habitats are often supported by highly specific soils, and located in unique geomorphologic regions. The reason most plant species are listed as "endangered" or "threatened" is because of their very high degree of environmental specificity and narrow geographic ranges, that is, because of their endemism.

3PR questions the adequacy of the environmental analyses regarding listed (endemic) plant species, as well as the merits of the relocation alternative, or mitigation alternative, because no studies are presented in the DAEIS indicating which, if any, relocated listed plant species have been successfully established as viable, self-sustaining (an important criteria) populations, which continue without human intervention and maintenance into the long term. Much has been published regarding the failures of such relocation ventures (CDFW 1991), especially failures involving mitigation projects. Many relocation projects involving listed or endemic plant species which yield living plants for some period of time, later fail for a variety of known and unknown reasons, even with considerable artificial cultivation "life support" efforts. This failure is due to complex ecological factors that govern such reintroduction attempts (Menges 2008). No published research supporting the viability or success of listed plant relocation is cited in the DAEIS. The concept of native plant relocation is flawed because, as previously stated, such rare native plants are very critically integrated with their native environments. That's why the term "critical habitat" is used in relation to their ecological needs.

ENDANGERED PLANT SPECIES

* Substantive Comment:

3PR further questions the accuracy of information in the DAEIS, because the table of listed plants which purportedly are found in the CFPD is in gross error due to omissions. And, because NEPA directs that EIS process coordinate and be consistent with state and local agencies. The Florida Department of Agriculture

(FDA) lists additional endangered species not listed by the U.S. Fish and Wildlife Service, and the State Comprehensive Plan of Florida requires that mining and mineral extraction protect natural resources.

RELOCATION OF PLANTS

* Substantive Comment:

The DAEIS states that "*In recent years, listed plant species and slow-moving listed animal species, such as the state-listed gopher tortoise, that are identified during pre-clearing surveys have been relocated before land disturbance to suitable onsite preservation or reclamation areas, or to suitable offsite areas.*" The anonymous author(s) of this statement are assumed to be the Applicants. The DAEIS does not specify the percentages of the total populations of such species which were relocated, and no long-term success data are provided.

As for animals, it is true that the gopher tortoise inhabits a wide range of habits, and can sometimes utilize non-native, or partially native sites, but plants and animals are products of their environments, that is, products of, and specific to, their particular ecological communities or vegetation associations, and functional populations normally do not establish and endure for long periods. It is crucial that ecosystems be preserved in order to protect listed plant and animal species. (This is discussed further in other of 3PR's comments).

* Recommendation:

Based on the current state of scientific literature, there is no evidence that many of the listed plant species which might occur within the CFPD can be successfully established, in the long term, on reclaimed lands. In any case, the DAEIS offers no data and analyses which would support the feasibility of such experiments. Many species cannot be relocated successfully even back into their own habitats, or into sites identical to the donor sites (Menges 2008).

It is important that the long-term status of these token introduction attempts be analyzed as part of any relocation or reintroduction attempts, and that a cumulative analysis be conducted to quantify the amount/numbers and diversity of important Florida native plants species which have been, and which will be eliminated as a result of past, present, and proposed future phosphate strip mining, and unmined, but potentially mineable area within the CFPD. Paramount in these studies is the need to evaluate genetic erosion, that is, gene pool destruction of locally adapted species and ecotypes.

INACCURATE WILDLIFE SURVEYS

* Substantive Comment:

3PR questions the accuracy of the information and the adequacy of the environmental analyses in the DAEIS, because of obvious errors and omissions in describing wildlife, and because in-depth site-specific ecosystem and wildlife analyses should have been conducted by "independent", unbiased third parties.

In 2003, the Hardee County Mining Department staff and a several other professional biologists (consultants) conducted field surveys in to order verify wildlife surveys provided by the Applicant. The Applicant's data was found to be highly inaccurate in each case, and for each site surveyed/verified. In areas where the Applicant had not reported listed wildlife, hundreds of gopher tortoise, several gopher frogs, and

several listed or rare plant species were found. Additionally, a primary recipient site used by one phosphate strip mining company for the relocation of gopher tortoise was carefully surveyed by county staff, and no tortoise were found. The site consisted of "rocky" reclaimed land, was infested with weedy species, and was observed to be completely unsuitable as habitat for tortoise (although apparently authorized as a recipient site). It appears that applicants for mining permits have misrepresented or mischaracterized ecosystem resource and biota, grossly understating the actual species richness and habitat quality.

* Recommendation:

The significance of the above example is to illustrate the strong need for environmental data and analysis, including ecosystem evaluations and species surveys, which has not been provided by applicants. Important environmental data and analyses must be objective and independently verifiable, that is, developed by qualified third party scientists.

"COGONGRASS" INFESTATIONS ON MINED LANDS

* Substantive Comment:

3PR questions the accuracy of information and adequacy of the environmental analyses in the DAEIS because the very substantially significant issue of the negative effects of cogongrass infestations on reclaimed phosphate strip mined land is not addressed, nor is the species mentioned in the report. This section states that *"The National Invasive Species Council (NISC) was established by EO 13112 to ensure that federal programs and activities to prevent and control invasive species are coordinated, effective, and efficient."*

The rapid and dense colonization of "reclaimed" mine land by the federally listed noxious weed known as "cogongrass" (*Imperata cylindrica*) (USDA 2010) represents an exceedingly serious and highly significant environmental issue. There are extensive and often contiguous infestations of this highly invasive, environmentally destructive and difficult to control weed dominating the herbaceous layers of many existing "reclaimed" and abandoned mine lands. The species succeeds vigorously in disturbed substrates such as those generated by the phosphate strip mining industry as a result of mining, "reclamation" activities, ancillary operations and activities, and site maintenance. This invasive plant thrives and succeeds in nutrient laden substrates, and substrates which will not support native ecosystems, such as the rocky ancient excavated materials distributed at the surface in the post-mine scenario.

"One of the more recent invaders to plague central Florida is the Asian weed, cogongrass. Cogongrass is not a serious problem on intensively managed agricultural lands where the normal operations include repeated tillage and herbicide applications. However, it has become a serious problem on less intensively managed lands such as rangelands, pastures, roadsides, reclaimed phosphate mines ..." (FIPR 1997).

Cogongrass alters fire ecology because it usually grows very densely and burns hot (B. Nelson / SWFWMD, Land Management, pers. comm.). These attributes have the effect of preventing or excluding native herbaceous species due to shading, crowding, and radical modification of essential fire regimes. The species is virtually impossible to effectively eradicate on a large scale due to physical land constraints and high economic costs, and because of the fact that the species simply recolonizes immediately, often with even greater vigor and aggressiveness. Based on observed aerial extents (cover) it is logical that the mined and/or

restored areas of the CFPD represent primary sources of cogongrass seed generation and dispersal for much of the region. "*Cogongrass spikelets are wind dispersed and have the potential to travel great distances*" (FIPR 1997). The species is also very difficult to eradicate on a small scale without irreparably damaging the fragile, specialized soils and unique herbaceous layers of natural ecosystems such as flatwoods, live oak hammocks, xeric uplands, including transitional areas.

Because the native plants and animals of the precious, and now rare or uncommon native vegetation communities and ecosystems of Florida require specific, undisturbed native soils, and also require interaction with the hundreds of other species within their respective "communities", the effects of phosphate strip mining together with the attraction of cogongrass to mined, disturbed, and reclaimed lands, has been devastating to the natural environment.

The purpose of NEPA is "*Protection of the Environment*". Further phosphate strip mining will provide even more disturbed, non-native substrates which, as with past mined lands, will be destined to be dominated by the exceedingly difficult or impossible to eradicate, noxious cogongrass weed.

There has been considerable research, throughout several states, and countries, relating to the negative impacts of cogongrass. A large amount of resources has been spent specifically studying the problem as it exists on mined and "reclaimed" phosphate lands.

However, the DAEIS does not mention this immensely significant environmental problem which is directly relevant to phosphate strip mining. Inexplicably, the terms "cogongrass" and "*Imperata cylindrica*" do not appear in the document, even though this species may be the dominant, or sub-dominant biological upland feature associated with mined land. The DAEIS is therefore inadequate and inaccurate in that it did not consider the devastating effect of cogon grass on the environment, and the continuing massive problem it presents to the natural environment.

The problem of extensive, nearly ubiquitous infestations of cogongrass which occur on "reclaimed" phosphate mined lands should be solved before additional phosphate mine permits are issued. The plant is an extremely serious invasive noxious weed. It is economically infeasible to eradicate the plant on a large scale, and management attempts can damage native vegetative communities.

DAEIS REFERENCES INAPPROPRIATE

* Substantive Comment:

The references upon which the DAEIS was presumably based are not annotated. It is therefore not possible to know how they are believed relevant or how their contents might have been interpreted and/or applied in formulating the various sections of the document. In many instance citations are made, but there is no means of determining how, why, or what information may have been considered or included.

Larger concerns relate to the fact that accessibility to copies of many of the papers is difficult and expensive, and in some cases, not feasible because the document or resource is not publicly or conveniently available. If there is a consolidated source of these references and sources of information of which 3PR, due to some oversight, is not aware, then please disregard this portion of the comment.

Many of the referenced sources in the DAEIS originate from government agencies, the phosphate industry, the Phosphate Council, phosphate consultants, or phosphate industry proponents. These include permit applications, industrial-engineering-hydrology-mining studies, survey results, various data, website access links, and undocumented personal communications.

Not included in the DAEIS references are the many important studies and research relating to (See enumerated issues starting on Page 7).

3PR's comments, objections, and recommendations are based on the scientific knowledge and observations of regional experts, published scientific literature developed by regional environmental experts, and data and analyses developed by, and freely available from, public sources. 3PR has provided facts which unequivocally demonstrate that the DAEIS is insufficient and inadequate for its legally required purpose of "Protection of the Environment".

40 CFR. 1502.9 Draft, final, and supplemental statements.

Except for proposals for legislation as provided in Sec. 1506.8 environmental impact statements shall be prepared in two stages and may be supplemented.

(a) Draft environmental impact statements shall be prepared in accordance with the scope decided upon in the scoping process. The lead agency shall work with the cooperating agencies and shall obtain comments as required in Part 1503 of this chapter. The draft statement must fulfill and satisfy to the fullest extent possible the requirements established for final statements in section 102(2)(C) of the Act. If a draft statement is so inadequate as to preclude meaningful analysis, the agency shall prepare and circulate a revised draft of the appropriate portion. The agency shall make every effort to disclose and discuss at appropriate points in the draft statement all major points of view on the environmental impacts of the alternatives including the proposed action.

Based on the current levels of data, analyses, and other information which, although not included or considered in the DAEIS, were readily and easily obtainable, should have been included as standard professional practice. Resources should have been obtained independently by soliciting them from regional experts and consulting the commonly available scientific literature, libraries, biological research institutions, and public agencies conducting research. It is clearly evident that for the remaining (unmined) portions of the CFPD, that the scientifically, economically, and morally supported alternative, essential for the protection of the human society, human health and well-being, and the irreplaceable biological, ecological, and hydrologic resources of west-central Florida, is Alternative-1 ("No Action" / "no permit"), that is "no additional phosphate mining" alternative. It is apparent to any scientists who have expert knowledge concerning the biological, ecological, and hydrologic (water resources) of the CFPD, that obtaining and analyzing more environmental information, which is actually specific to the unmined regions of the CFPD, will result in an even stronger evidence supporting Alternative-1 ("No Action", or "no additional phosphate mining") alternative.

Numerous on-site, independent environmental studies need to be conducted throughout the CFPD, and well beyond, especially "downstream", that is, down the rivers and streams to Charlotte Harbor and coastal zones of the gulf coast of Florida where the pollution and frequent toxic spills of the phosphate industry will ultimately find there way.

2457 It is unconscionable to entertain the concept of destroying an entire region of subtropical Florida,
2458 involving nearly 60,000 acres, supporting billions of animals, plants, and other living organisms which
2459 comprise the natural environment, purely for the benefit of a single industry. The life-giving biotic systems
2460 which would be lost provide sustenance, water, living space, recreation, and climate moderation. These natural
2461 systems constitute the essential biological and physical base which support and sustain human existence. Their
2462 destruction places at risk public health, properties and property values, economies, and important resources
2463 extending far outside and downstream of the actual confines of the CFPD. Many of these liabilities extend well
2464 into the future, and some into perpetuity. Phosphate strip mining sacrifices the environmental heritage of
2465 mankind for the short term profits of those not sustaining these impacts. If no mining were to occur, these large
2466 tracts of land would potentially provide space, agriculture, and water for millions of people. Such disregard for
2467 the environment and humanity is in stark contrast to the stated purpose of NEPA, which is "*Protection of the*
2468 *Environment*"⁸.

2469 Phosphate mining is a non-sustainable, non-renewable activity, and its extraction has already been
2470 utterly disastrous to a region of approximately 350,000 acres. Reclaimed phosphate lands, as attempts at
2471 reestablishing native ecosystems, are well-documented failures in most every regard. With such a horrendous
2472 environmental record, issuing new approvals for additional phosphate strip mining in west-central Florida is in
2473 no way acceptable.

2475 PROBLEMS WITH DAEIS REFERENCES

2476 * Substantive Comment:

2477 3PR questions the adequacy of the environmental analyses and the accuracy of the information in the
2478 DAEIS, because many references are not cited according to accepted standards or are entirely erroneous. The
2479 majority of reference (bibliographic) citations do not provide adequate source information. Also, see previous
2480 comments concerning referenced information and documents. A significant example relates to the following
2481 "reference" which appears to reference a document.

2482 DAEIS Page 7-11, lines 9-10:

2483 *SWFWMD (Southwest Florida Water Management District). 2009. Florida Land Use*
2484 *Cover Classification System (FLUCCS).*

2486 However, no such document exists. The most recent version of the universally used Florida Land Use
2487 Cover Classification System was published by FDOT in 1990. The DAEIS should have referenced that as the
2488 1999 Land Use GIS data layer developed by SWFWMD contractors. Also, no download date or metadata is
2489 provided. 3PR should be entitled to all digital and other information which was used as basis for the DAEIS so
2490 that it may verify the representations which the Applicants have made.

2491 3PR has very significant concerns relating to the methodologies and results of the 2009 SWFWMD
2492 GIS mapping of District land uses purportedly using FLUCCS (1990) as found in 3PR's references below: 3PR
2493 finds that this mapping is in error in important ways, in that non-mining cover type designations have been used
2494 for areas of mining and areas of reclamation. FDOT FLUCCS 1990 requires that once an area has been mined,

⁸ NEPA - 40 CFR 1500.1 Purpose

it remains a "160 Extractive" mining category, the best and highest category of which is "165 Reclaimed Land". 3PR has unanswered questions concerning the application of FLUCCS categories in the mapping of existing land uses and cover types, and the way in which the system was applied in mapping post-mining cover.

3PR COMMENTS BASED ON SCIENTIFIC LITERATURE

The DAEIS is not adequate or accurate because it does not broadly consider readily available, independent, regionally qualified, third-party research, which is crucially relevant to the understanding and protection of the vast repositories of natural resources proposed for destruction as a result of phosphate strip mining. The DAEIS is further inadequate, incomplete, and generally deficient because the following important, relevant, or regionally applicable data, research, and analyses were omitted and therefore not considered in the decision-making processes during the development the document. In addition, it appears that a significant percentage of the resources cited in the DAEIS were obtained from the phosphate industry, phosphate industry contractors, or established phosphate mining proponents with vested interest in phosphate mining. In addition to the many other problems relating to the DAEIS source materials, which 3PR cited previously, the references cited infer that the base of information used for the DAEIS is not sufficiently impartial, neutral, or qualified.

3PR presents the following comments which are based on the cited publications. Each substantive comment may include several issues which are interrelated with the issues, information, and concepts in other 3PR comments and narratives:

Brewer, J. S. 2008. Declines in plant species richness and endemic plant species in longleaf pine savannas invaded by *Imperata cylindrica*. Biol Invasions 10:1257-1264.

* Summary:

Examines the invasiveness of cogongrass (*Imperata cylindrica*) into native longleaf pine flatwoods and its impacts on species composition. The research determined that the species excluded many herbaceous species, mainly by shading them out, or through aggressive colonization and expansion. Cogongrass patch expansion results in dramatic declines in species richness. Invasion of longleaf pine communities will likely cause significant losses of short habitat-specialists and reduce the distinctiveness of the native flora.

* Substantive Comment:

3PR questions the adequacy of the environmental analyses and accuracy of the information in the DAEIS, because it fails even to mention cogongrass, and the economic and environmental consequences of such unbridled comprehensive infestations as occur on previously mined lands, including "reclaimed" lands. Mined and reclaimed phosphate lands arguably host the greatest aerial extent of cogongrass infestations in west central Florida. This is a serious and for all practical purposes an insolvable problem caused by large-scale mining disturbances and conversions of native soils to clays, silica, overburden, and other discarded mining wastes, that is, "reclamation" materials. This and other research indicates that cogongrass infestations are highly damaging to native ecosystems and effectively preclude or prevent the success of many types of restoration and reclamation. Also, the vast infestations of cogongrass in the phosphate district act as a seed

source for the entire regions and, as a result of storms, no doubt infest many distant properties. Cogongrass has proven very difficult and expensive to control, and even much more difficult to eradicate.

* Recommendation:

Additional phosphate strip mining should not be permitted to proceed until the cogongrass disaster and its many serious environmental and economic concerns are resolved.

CDFW. 1991. Mitigation-related transplantation, relocation and reintroduction project involving endangered and threatened, and rare plant species in California. California Department of Fish & Game, June 14, 1991.

* Summary:

This research investigated and evaluated the status of many listed and rare plant projects including the efficacy and overall success of transplantation, relocation, and reintroduction of California State-listed endangered, threatened, and rare species. The primary results indicated that only 15% of 53 attempts were deemed successful. And, only 8% of relocations for mitigation were successful.

* Substantive Comment:

3PR questions the accuracy of information and the adequacy of the environmental analyses, because such are entirely lacking in the DAEIS ! 3PR therefore also questions the merits of the relocation alternative. In general, the vast majority of endemic/listed plant relocation attempts fail, for many reasons, either in the short or long-term. Many such plants cannot even tolerate minor environmental/ecological changes or disturbances. An action other than the no-action (deny permit) alternative will result in the destruction of vast amounts of irreplaceable endemic/listed plant habitat, because ecosystems are destroyed on a massive scale by phosphate strip mining, its related activities, and its short and long term environmental effects.

* Recommendation:

Preserve and manage large enough on-site tracts of listed plant habitat to protect the local ecosystems which are essential for the long-term survival of Florida's precious endemic flora. Seek direction from the primary and only preeminent restoration ecology center in central Florida, Archbold Biology Station.

CFRPC (Central Florida Regional Planning Council). 2002. Land Use Suitability Index for Use in Hardee County. Adopted November 12, 2002, Hardee County Board of County Commissioners.

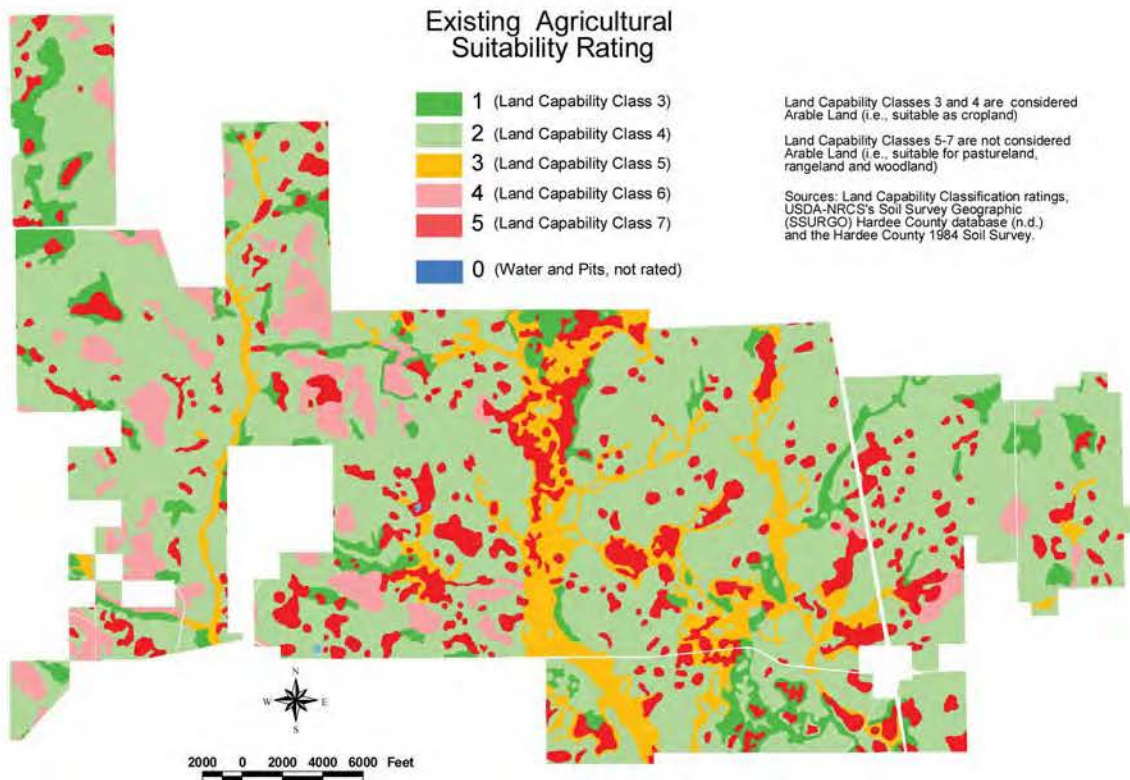
* Summary:

This site-specific study examines the Ona Mine, concludes that: "The results of this study indicate that future land use patterns, in particular the ability to support various types of commercial agriculture and urban development, may be substantially altered as a result of large-scale phosphate mining in Hardee County."

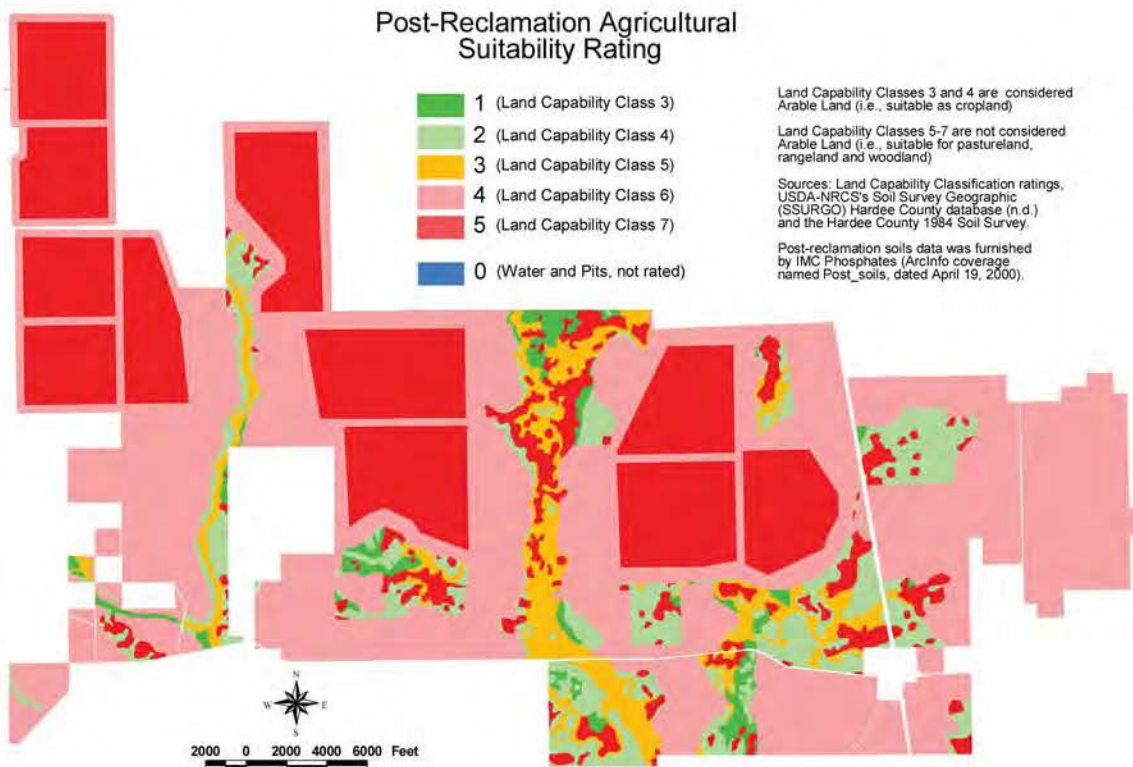
* Substantive Comment:

This study indicates that phosphate strip mining results in regional-wide degradation and reduction in the ability of land to support viable agriculture and certain other uses. The scientific findings and the fact that very few "reclaimed" phosphate strip mines have been used for residential or public retail uses, objectively refutes many of the statements of the DAEIS. The following two graphics are very informative in providing a visual representation of the negative impacts of phosphate strip mining on the suitability of land for future use and on the environment.

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CHNEP. 2010. Charlotte Harbor Regional Climate Change Vulnerability Assessment. Charlotte Harbor National Estuary Program. Port Charlotte, Fla.

* Summary:

Summarizes "Climate Change" as it may affect areas monitored by the CHNEP, and provides a general vulnerability discussion.

* Substantive Comment:

3PR questions the adequacy of environmental analyses and the accuracy of the information contained in the DAEIS, because the projected effects of the phenomenon of climate change have not been thoroughly examined in regard to its impacts to ecosystems and the environment, including, but not limited to, forced migration of animals and the potential inability of plant and vegetative communities to adapt. 3PR also questions the merits of alternatives other than Alternative-1 ("No Action" / "no permit") which are presented in the DAEIS, in part because of the excessively long permit terms. Rises in sea levels have recently been projected to reach as high as 2 meters by the year 2100 (Pfeffer 2008). Such changes will have profound effects on coastal communities, potentially requiring a slow evacuation of the majority of Florida's population (which is concentrated within a few miles of the coast), and the complete restructuring of business and society inland. Not planning for these changes by permitting inland barriers, and large-scale loss of farmland to phosphate strip mining, may not be in the interest of good land-use planning. Changes in climate patterns related to global warming are significant concerns for long-range environmental planning, and even short-range planning. Climate change and ozone depletion will affect humans and the natural environment and, in fact, have already had profound negative impacts in Antarctica, where "krill" (the main source of food for larger animals, including seals) has declined as much as 80% during the last 30 years (Reid et al 2010). Increased atmospheric temperatures and concomitant elevated sea levels are causing, among other serious problems, ocean encroachment of coastal lands which will drive coastal communities inland, and which will reduce inland areas as watercourses become wider and deeper. Wetlands and lowlands also will become submerged or inundated for longer periods. Because much of the geographic area and many environmental concerns of the CHNEP study area overlap with the CFPD, the CHNEP Technical Advisory Committee may be considered one of the most important scientific government organizations for the USCOE to publicly cooperate with.

Cole, S., T. Hington, and K. Alvarez. 1994. Vegetative characteristics of contiguous dry prairie on two soil types in Hardee County. Resource Management Notes 7(3):15-16.

* Summary:

Species diversity and density were significantly different between soil types, with some species considered "indicators" for specific soil types. There were significant differences in characteristics of less dominant plants species across soil types in dry prairie. Fire regime is very important in maintaining and controlling vegetative characteristics.

* Substantive Comment:

(Same comments as under Orzell & Bridges 2006, Huck 1987, and as elsewhere in 3PR's comments).

Daily, Gretchen C. et al. 1997. Ecosystem Services: Benefits Supplied to Human Societies by Natural Ecosystems. Issues in Ecology. No. 2, Spring 1997.

* Summary:

Provides information and research results concerning "Ecosystem Services" and the essential need to protect ecosystems in order to human existence to continue.

* Substantive Comment:

3PR objects and questions the adequacy of the environmental analysis and accuracy of the information in the DAEIS, because it does not consider the tremendous negative impacts which phosphate strip mining inflicts on biotic ecosystems and "ecosystem services". Because the purpose of NEPA is "Protection of the Environment", the protection of ecosystems, ecosystem services, and biodiversity must be the primary focus of the USCOE in evaluating the past, new, and cumulative environmental impacts of phosphate strip mining.

Diaz, S., et al. 2006. Biodiversity loss threatens human well-being. PLoS Biology 4(8):e277.

* Summary:

This important research summarizes contemporary science involving ecosystem services, and provides a synthesis from the latest scientific literature of the role of biodiversity in ecosystem services and human well-being. The findings indicate that the most dramatic changes in ecosystem services likely come from altered compositions of ecological communities and from the loss of locally abundant species rather than from the loss of already rare species.

* Substantive Comment:

3PR questions the adequacy of the DAEIS, because there is no discussion of ecosystem services, nor are there any similar considerations consisting of rational dialogs and analyses relating to the need for environmental/ecosystem.

FDOT. 1990. Florida Land Use, Cover and Forms Classification System (Handbook), 3rd ed. Dept. of Trans. Surveying and Mapping, Geo. Mapping Sect., Tallahassee.

* Summary:

The standard land use and cover classification and mapping system used by government agencies, professionals, and scientists.

* Substantive Comment:

The FLUCCS system has been inaccurately and improperly applied in developing land use maps for the SWFWMD which includes the CFPD. FLUCCS requires that once land has been mined that it must be assigned a "mining" cover type and classification. The DAEIS is not accurate and is inadequate because it purports to have been based on SWFWMD land use mapping data which 3PR contends is in error and does not conform to the primary and universally used standard, which is FDOT 1990 FLUCCS.

FFWCC. 2003. The 2001 Economic Benefits of Watchable Wildlife Recreation in Florida. Florida Fish and Wildlife Conservation Commission. Southwick Associates, Fernandina Beach, Fla.

* Summary:

This report examines the contributions of watchable wildlife recreation to the Florida economy. Tables detail the positive economic impact and other revenues from three forms of retail sales and economic impact, earnings, employment, and tax revenues.

* Substantive Comment:

3PR questions the accuracy of the information in the DAEIS, because it relies on questionable sources for its economic analysis, mostly ignores the highly specific Hazen and Sawyer economic analysis, and completely evades considering the self-sustaining self-renewing and very economically significant contributions of "Watchable" wildlife. Phosphate strip mining is a "here-then-gone" industry which provide only a few local, full-time jobs, is massively destructive to all aspects of the environment, and leaves a legacy which includes a myriad of completely untenable liabilities, such as many square miles of waste clay disposal enclosed by high dams, elevated radiation levels, toxic spills, noxious weed infestations, a vast ecological wasteland, and many other potential negative impacts and hazards to humans and wildlife alike. Managing natural, self-sustaining ecosystems to aid the economy in the near and long-term, is not only essential to human kind, but is infinitely more reasonable than the self-destructive course of action of permitting area-wide phosphate strip mining, potentially over 100,000 acres in Hardee County alone, and eventually, most of the county. Sources of jobs and revenues involving watchable wildlife, outdoor recreation, and eco-tourism are also much more compatible with the rural and agriculture traditions of Hardee County.

FIPR. 1983. Polonium-210 and Lead-210 in Food and Tobacco Products: A Review of the Parameters and an Estimate of Potential Exposure and Dose. Institute for Phosphate Research, No. 05-DFP-015.

* Summary:

This research addresses some aspects of the accumulation of Polonium and Lead in foods and tobacco. It indicates that these contaminants are mobile through various transport mechanisms, such as food chain transport, including inhalation exposure involving tobacco. It also provides an enlightening description of the process of aerial deposition.

* Substantive Comment:

An important and relevant finding of this research is that "For most food items and tobacco, aerosol deposition seems to be the principal mode of Pb-210 and Po-210 entry. This feature is **of particular concern for leafy vegetables. As a result, only fruit-bearing crops such as citrus, berries, and cane fruits should be grown on phosphate-reclaimed land.**" 3PR questions with reasonable basis the adequacy of environmental analyses in the DAEIS in regard to elevated low-level radiation associated with phosphate mining. The DAEIS does not fully examine and address potential risks to humans and the environment of low-level radiation exposure, particular cumulative exposure and impacts.

* Recommendation:

The following change/revisions are necessary in order to address the inadequacies of the DAEIS: Comprehensive studies are needed which include, but are not limited to, epidemiological investigations

assessing the potential affects of elevated values of low-level radiation relating to phosphate strip mining and related operations. Such studies must be comprehensive, employ the highest and best state of current technology, and be conducted in a peer review environment. The studies should not only measure individual source, but all cumulative effects.

FIPR. 1986a. Environmental Contaminants in Birds: Phosphate-Mine and Natural Wetlands. FIPR No. 05-003-045. Bartow, Fla.

* Summary:

This paper provides basic investigation of the accumulation of Radium in humans, birds, fish, and certain vegetation via food chains. It reports, among other results of considerable concern, that *"the average bone concentration (of Radium-226) in waterfowl from settling ponds in central Florida was about 4 times the recommended maximum for humans."*

* Substantive Comment:

3PR questions the adequacy of the environmental analyses in the DAEIS, because the results of this research inspire great concern for the birdlife, and the general environment, in and near phosphate strip mines, or more specifically waste clay disposal sites (CSAs). The DAEIS mostly avoids sincere discussion of the elevated low-level radiation risks as it relates to phosphate strip mining and other phosphate related industry. Human health and the health of the environment may be at risk from phosphate strip mining activities.

FIPR. 1986b. Radiation and Your Environment. Florida Institute for Phosphate Research, No. 05-000-036. Bartow, Fla.

* Summary:

Provides general information, mainly about low-level radiation, ionizing radiation, radon, units of measurement and dose measurement, and well as some household tips. Provides a "Radon Risk Evaluation Chart".

* Substantive Comment:

The following statement made in this publication re-enforces the need for current, updated, epidemiological studies of low-level radiation risks, especially where cumulative effects may be involved: "We do know that large doses of radiation given at high dose rates can cause cancers and genetic disorders, but we do not know for sure that low doses and dose rates cause these effects. For protective reasons (radiation regulations and standards), *we assume that low doses also cause human health effects to a directly proportional, but smaller degree*".

FIPR. 1987. Radioelement Migration in Natural and Mined Phosphate Terrains. Florida Institute for Phosphate Research, No. 05-002-027. Bartow, Fla.

* Summary:

As a result of mining and processing operations, most of the radioelements accumulate in the waste clays. Radium and thorium also are present in the gypsum stacks and uranium is present in the acid products and fertilizer.

* Substantive Comment:

3PR questions the accuracy of the information and adequacy of the environmental analyses in the DAEIS, because a body of research exists which suggests that low-level radiation is a potential threat to humans and the environment, and also to the FAS, as indicated below. Two of the primary transport mechanisms through which the FAS may become contaminated is along well casings and via "induced recharge". The research further validates the radiation problem, and also raises cause for concern due increased vulnerability of the FAS from consumptive use / withdrawals. (Also, see several previous 3PR comments). The following findings are notable:

"The regional distribution of uranium and radium in groundwaters and surface waters appears not to have been disturbed. The one possible exception is in the Floridian Aquifer in the immediate areas of mining.' Higher than normal, though not exceptionally unusual, uranium concentration values are observed. We speculate that this may be related in some way to enhanced industrial water useage".

"A large proportion of the radioelements in phosphate ore ends up in the clay even before the adsorption process hypothesized above. We calculate that approximately 45% of the uranium and radium, and 55% of the thorium in the original matrix is in the clays that are removed by the washing process. In the gypsum residue resulting from further treatment stages are found 3% of the uranium, 30% of the radium, and 35% of the thorium of the original matrix. Less than 10% of the radium and thorium end up in fertilizer and chemical products, but as much as 30% of the uranium does".

FIPR. 1997. Ecology, Physiology, and Management of Cogongrass (*Imperata cylindrica*). Institute for Phosphate Research, No. 03-107-140. Bartow, Fla.

* Summary:

An in depth examination of the biology of cogongrass, its properties as a noxious weed, and various concepts of management.

* Substantive Comment:

(See other comments).

FIPR. 2001. Reclaimed phosphate clay settling area investigation: hydrologic model calibration and ultimate clay elevation prediction – final report. Florida Institute of Phosphate Research, No. 03-109-176. Bartow, Fla.

* Summary:

This research included monitoring hydrologic and meteorological conditions, mapping soils and vegetation, and developing topographic maps using photogrammetry. Field and laboratory data were used in models to estimate the effects of clay consolidation on post-reclamation topography and to calibrate hydrologic simulation programs. This report presents the research objectives, work plan, and study results of a research project designed to monitor and evaluate the hydrology and clay consolidation behavior of phosphate CSAs.

The author's research published in 2001 reported that *"There are more than 100,000 acres of clay settling areas (CSAs) in Florida. Presently operating phosphate mines in Florida have over 60,000 acres of above ground clay settling areas (CSAs), with an additional 20,000 acres designated for future CSAs."* Also stated determined was that *"The present guidelines used in CSA design relative to hydrology will probably prevent downstream flooding during large rain events. Though, these guidelines also result in post-reclamation conditions that fail to restore the low flow characteristics of the pre-mined land form".*

* Substantive Comment:

3PR questions the adequacy of the environmental analysis and the accuracy of the information in the DAEIS, because the findings of this research both differ directly from the assertions of the DAEIS in that indicate that the designs of CSAs fail to restore the low-flow characteristics of the pre-mined land, and also indicate difficulty in the predictability of some aspects of CSA hydrology. The incredible amounts of clays and unused mining materials which the phosphate strip mining industry disposes of in "CSAs" and over other post-mining areas, together with the fantastic tonnage of reagent chemicals returned with these wastes, and generalized elevated radiation as well, are ample reason to discontinue all phosphate strip mining in Florida.

In addition, the report states that CSA design relative to hydrology will "probably" prevent downstream flooding "during large rain events". The term "probably" is not very reassuring, especially because it is merely used in the context of a large rain storm, and does not address the larger concern of tropical hurricanes. The additional highly distressing findings, which would be no surprise to any reasonable person even without study, is that the low-flows of native soils and geology cannot be engineered into one CSA, much less 180,000 acres of waste clay containments. That's approximately 34 sq miles. 3PR suspects even this figure is inaccurate, because it likely only involves designated CSAs, and not all other areas of clay deposited by the phosphate strip mining industry, and of course does not include the vast areas of "sand clay mix" which have also been dumped back into the environment and called "reclaimed" land.

FIPR. 2001b. Fate and consequences to the environment of reagents associated with rock phosphate processing. Florida Institute for Phosphate Research, No. 02-104-172. Bartow, Fla..

* Summary:

Examines some basic aspects of reagent migration, and presents other information about rock phosphate processing.

* Substantive Comment:

(See previously provided comment and discussion relating to reagents).

FIPR. 2008b. An investigation of floating reagents, final report. Florida Institute for Phosphate Research, No. 02-158-227. Bartow, Fla.

* Summary:

Describes "floating" reagents and various processes. Provides various data and information on a number of reagents and their utility in phosphate refinement/recovery.

* Substantive Comment: (See previously provided comment and discussion relating to reagents).

Gofman, John W. 1990. Radiation-induced cancer from low-dose exposure: an independent analysis. Committee for Nuclear Responsibility.

* Summary:

This research, and others, conclude that there is no safe dose or dose rate of ionizing radiation and that even the lowest conceivable doses present cancer risks. Gofman was an established authority on nuclear physics. Dr. John W. Gofman, M.D., Ph.D.

Considered by some as one of the foremost independent authorities, John William Gofman was Professor Emeritus of Molecular and Cell Biology in the University of California at Berkeley, and Lecturer at the Department of Medicine, University of California School of Medicine at San Francisco. He is the author of several books and more than a hundred scientific papers in peer-review journals in the fields of nuclear / physical chemistry, coronary heart disease, ultra-centrifugal analysis of the serum lipoproteins, the relationship of human chromosomes to cancer, and the biological effects of radiation, with especial reference to causation of cancer and hereditary injury.

* Substantive Comment:

The DAEIS does not consider the potentially negative, cumulative, and harmful effects of exposure to increased low-level radiation resulting from the geologic impacts of phosphate strip mining, the distribution of mining products, and the contamination of foods and products (such as tobacco) from phosphate fertilizers.

Hazen and Sawyer. 2003. Hardee County, Florida: Economic Impact of the Ona mine to Hardee County. Final Report, July 28, 2003. Hardee County Board of County Commissioners, by Grace Johns, Hazen and Sawyer, Environmental Engineers and Scientists.

* Summary:

Evaluates the potential economic effects to Hardee County from the proposed Ona Mine located in western Hardee County. This analysis estimates the change in employment and income to Hardee County residents that would be generated from the Ona mine relative to land uses on the Ona Property that would take place under baseline conditions. Presents a reasonable scenario of the potential land use given the best available information. Land use of the Ona Property under the baseline or "no-mining" scenario was based on reasonable assumptions of how western Hardee County would likely develop if no additional land was mined. All baseline land uses are consistent with Hardee County housing projections from the University of Florida Bureau of Economic and Business Research and historic agricultural acreage trends in Hardee County and in Florida from the Florida Agricultural Statistics Service.

* Substantive Comment:

(Refer to other comments where cited, including, but not limited to "Environmental Justice" comments).

HCBOCC. 2010. Hardee County, Sustainable Hardee Visioning for the Future. Hardee County Board of County Commissioners, Wauchula, Florida.

* Summary:

"The Visioning is aimed at identifying community goals and a means to achieve those goals, both short and long-term. Hardee County is faced with difficult choices in the current economic times. Realizing that growth and development have the ability to either support or hamper the community' desired, county officials began to develop a Community Vision for the community that could properly guide future development and identify solutions to challenges. The Visioning process is intended to utilize a broad range of community comments, issues and opportunities in developing community recommended strategies. The Visioning process is also intended to develop a framework within which to proactively plan, develop milestones

and identify potential community champions for the recommendations. With each successive meeting, the community refined the broader comments into more focused, action oriented recommendations that will be used to develop the overall final Vision. The strategies identified are not necessarily government directed and/or supported, and in numerous cases involve local community and civic organizations with specific interest or association with related programs. This method creates broad based community support and responsibility for the implementation of the strategy. The County identified five areas of review and analysis that were discussed through a series of "Focus Groups" and community meetings to prepare the Visioning Report and to provide guidance for future projects and decisions. These groups included: Economic Development, Land Use/ Recreation/ Open Space/ Environment, Quality of Life/Housing, Education/ Workforce, Infrastructure."

* Substantive Comment:

3PR questions the adequacy of the DAEIS because it does not contain references to Hardee Count's "Visioning" process, or an adequate analysis of how the DAEIS is consistent with the goals, objectives, and policies of the Hardee County Comprehensive Land Use Plan. NEPA requires coordination with state and local agencies in order to help avoid inconsistencies with local regulations and planning.

* Recommendation:

3PR suggests that interested persons take aerial and surface tours of previously mined and reclaimed lands in northwestern Hardee County (and of the "four corners" and northwards), then tour areas of unmined lands. Such tours would no doubt help guide public opinion and Hardee County's visioning processes.

HCP&D, 2003. Draft - Staff Report for IMC -Phosphates Company Ona Mine (CFRPC: DRI 203-82). Hardee County, Board of County Commissioners, Hardee County Planning and Development. Wauchula, Florida.

* Summary:

This draft staff report characterizes the Ona Mine site and details many of the issues which were considered relevant to local, state, and federal law at the time. The document provides summaries and discussions, and detailed treatments and analyses of each individual significant issue relating to phosphate strip mining at the project site. The data and analyses were developed by regional experts in the biological sciences, and in the fields of hydrology, economics, and land use planning.

* Substantive Comment:

Although directly relevant research and analysis, authored by Hardee County Local Government is readily available as a public record, it was not incorporated into the DAEIS or used as a source of information. The following sections of NEPA, in order to accomplish its purpose of "protection of the environment", require coordination and cooperation with local governments during the development of the EIS. The only references in the DAEIS to the Hardee County Comprehensive plan, which contains numerous goals, objectives, and policies relating to mining, economy, and protection of the environment, are misleading references to the Mining Overlay Map as an indication of mining suitability, which it most definitely is not, but merely a map based on mining company ownership, and not promulgated based on any actual data and analysis which would suggest that the mapped regions is/are appropriate for phosphate strip mining, other than for being located within the CFPD. However, NEPA requires that the DAEIS must include discussions of "possible conflicts

between the proposed action and the objectives of local land use plans. The DAEIS is clearly inadequate and inaccurate, in that none of these NEPA requirements for "protection of the environment" are satisfied, that is, Hardee County Comprehensive Plan land use plan goals, objectives, and policies were not discussed.

40 CFR 1502.5 Timing

(b) For applications to the agency appropriate environmental assessments or statements shall be commenced no later than immediately after the application is received. Federal agencies are encouraged to begin preparation of such assessments or statements earlier, preferably jointly with applicable State or local agencies.

40 CFR 1502.16 Environmental consequences

This section forms the scientific and analytic basis for the comparisons under Sec. 1502.14. ... It shall include discussion of:

(c) Possible conflicts between the proposed action and the objectives of Federal, regional, State, and local (and in the case of a reservation, Indian tribe) land use plans, policies and controls for the area concerned.

Huck, Robin B. 1987. Plant Communities along an edaphic continuum in a central Florida watershed. Florida Sci. 50(2):88-110.

* Summary:

Vegetative gradient analysis in central Florida flatwoods region. Vegetation changed with topography, moisture regimes and soils. A correlation between soil types and vegetation was shown evident. The vegetative communities analyzed included palmetto prairie, savannah, palmetto zone, cypress slough, pine flatwoods, oak-palm woodland, maple swamp forest, ash swamp forest, maple-ash swamp forest, oak woodland, saw palmetto zone, cypress dome, palmetto prairie, and cypress pond.

* Substantive Comment:

This paper is in support of other comments explaining the correlation between native soils types, natural geology, natural hydrology and specific native vegetative communities and plant species, particular the substantive comment under the Orzell & Bridges (2006) reference.

Kremen, C. 2005. Managing ecosystem services: what do we need to know about their ecology? Ecology Letters 8:468-479.

* Summary:

Human domination of the biosphere greatly alters ecosystems, yet ecological understanding of ecosystem services is limited. The author discusses methods to incorporate vital ecological information into the environmental policy and management process.

* Substantive Comment:

3PR questions the adequacy of the environmental analyses of the DAEIS, because significant issues relating to the future of humanity were not discussed. The author stresses that proper understanding of ecosystem services is critical for our human future. There is no discussion of ecosystem services, nor are there any similar considerations of for protection of the environment found in the DAEIS.

2953 **Lyman, Gary H. (MD, MPH) et al. 1985. Association of Leukemia with Radium Groundwater**
2954 **Contamination. JAMA, 254(5):621-626.**

2955 * Summary:

2957 Radiation exposure, including the ingestion of radium, has been causally associated with leukemia in
2958 man. Groundwater samples from 27 counties on or near Florida phosphate lands were found to exceed 5 pCi/L
2959 total radium in 12.4% of measurements. The incidence of leukemia was greater in those counties with high
2960 levels of radium contamination (>10% of the samples contaminated) than in those with low levels of
2961 contamination. Rank correlation coefficients of 0.56 and 0.45 were observed between the radium
2962 contamination level and the incidence of total leukemia and acute myeloid leukemia, respectively. The
2963 standardized incidence density ratio for those in high-contamination counties was 1.5 for total leukemia and 2.0
2964 for acute myeloid leukemia. Further investigation is necessary, however, before a causal relationship between
2965 groundwater radium content and human leukemia can be established.

2966 * Substantive Comment:

2967 3PR questions the adequacy of the environmental analyses in the DAEIS, because this paper, and
2968 several others, specifically report statistically elevated cancer risks from human exposure to Radium-226
2969 contaminated groundwater. Numerous other published research report elevated low-level radiation associated
2970 with various sources within the CFPD, particularly on mined land and at waste clay disposal sites. The Lyman
2971 studies were published in the prestigious, peer-reviewed Journal of the American Medical Association (JAMA).

2972 * Recommendation:

2973 The body of research reporting radiation concerns relating to the phosphate strip mining and
2974 processing industry speaks for itself in terms of raising concern. Authors have indicated that elevated radiation
2975 means elevated risks, and warn about consuming food items from phosphate lands. As suggested elsewhere in
2976 3PR's comments, comprehensive, multi-team, "independent" "peer reviewed" studies are indicated in order to
2977 determine the level of potential threat to humans and the environment. Studies funded by the phosphate
2978 industry should be discarded, in favor of more objective, and more credible research conducted by leading
2979 medical researchers, institutions, and epidemiologists, such as Lyman, Stockwell, and Gofman.

2980 **MASS_2012. Public Health Fact Sheet on Radon. Commonwealth of Massachusetts. Accessed 10-Jul-2012:**
2981 **www.mass.gov**

2982 * Summary:

2985 Provides basic facts concerning Radon, and described health risks. "*Radon is a naturally occurring*
2986 *radioactive gas. It is produced in the ground through the normal decay of uranium and radium. As it decays,*
2987 *radon produces new radioactive elements called radon daughters or decay products. Radon and radon*
2988 *daughters cannot be detected by human senses because they are colorless, odorless, and tasteless.*" "*When*
2989 *radon undergoes radioactive breakdown, it decays into other radioactive elements called radon daughters.*
2990 *Radon daughters are solids, not gases, and stick to surfaces such as dust particles in the air. If contaminated*
2991 *dust is inhaled, these particles can adhere to the airways of the lung. As these radioactive dust particles break*
2992 *down further, they release small bursts of energy which can damage lung tissue and therefore increase the risk*

of developing lung cancer. In general, the risk increases as the level of radon and the length of exposure increases."

* Substantive Comment:

Because the DAEIS is required to consider all significant environmental issues, it should fully evaluate the direct and cumulative risks associated with elevated Radon levels. The DAEIS is inadequate because, although elevated low-level radiation from Radium-226 and Radon-222 and its daughters are discussed, the document does not thoroughly evaluate the present and future risks potentially presented by increased low-level as a cumulative factor. This is inconsistent with the requirement "*The NEPA process is intended to help public officials make decisions that are based on understanding of environmental consequences, and take actions that protect, restore, and enhance the environment*" A point of some note which is provided in the "Fact Sheet" is that radon "daughters" adhere to dust particles in the air. Mining and construction sites are often very dusty, with potentially elevated concentrations of particulates, and particles from large areas of unconsolidated or sparsely vegetated land. It appears that more current studies may be necessary in order to objectively quantify any potential for elevated low-level radiation, including any associated risks to humans and the environment, including any cumulative effects which involve the various documented sources of increased low-level radiation associated with the phosphate industry.

Menges, E. S. 2007. Integrating demography and fire management: An example from Florida scrub. Australian Journal of Botany 55:261-272.

* Summary:

Author reviews the ecology of fire in the scrub and analyzes life history and demographic data (most species studied for 10-15 years) of 16 rare and endangered plants of the scrub, and discusses the varied life history patterns of these plants. Some species balance two opposite strategies of survival in a fire-dominated system, seeding and sprouting, and others are more dependent on only one strategy.

* Substantive Comment:

3PR questions the adequacy of the environmental analyses in the DAEIS, because it does not acknowledge the necessity of proper upland ecosystem management through the use of prescribed fire. Fire is essential to the life histories of most plants in the Florida scrub, and as shown elsewhere in 3PR's comments, in the expansive dry prairie/flatwoods/pine-palmetto vegetative communities found throughout the southern half of the CFPD. "Pyrodiversity", the variation of fire regimes in time and space, is essential to the continued natural functioning of Florida's upland ecosystems. The role of fire in maintaining native upland ecosystems is nowhere discussed in the DAEIS. The only mention of fire or fire ecology is vaguely in regard to scrub jay mitigation. 3PR also questions the accuracy of the information in DAEIS, because it is stated that "*The phosphate industry uses chemical, mechanical, fire, hydrologic, and manual techniques to control nuisance and exotic plant species in mitigation areas.*" Although this statement is not in the context of fire ecology, it should be pointed out that burning the vast infestations of cogongrass which occur on mined and "reclaimed" lands is not compatible with what few native plant species may remain there, and also may not be compatible with some wildlife species. Also, using fire in an attempt to improve the appearance of land, without any real hope of

eradication (as is the case with cogongrass growing in post-mining substrates) creates smoke and other air pollution concerns.

Menges, E. S. 2008. Restoration demography and genetics of plants: When is a translocation successful? Australian Journal of Botany 56:187-196.

* Summary:

This review paper stresses the many complex ecological factors that govern a reintroduction and the many complex ecological relationships that must be re-established for a species reintroduction to be considered a success. Chief among them is the generation time of a species. For long-lived plants, it may take decades for the translocated plants to become reproductive.

* Substantive Comment:

Long-term monitoring of reintroductions is necessary to evaluate the success of a project, and funding for such monitoring should accommodate this long-term component of reintroduction projects.

Menges, E.S. and Gordon, D.R. 2010. Should mechanical treatments and herbicides be used as fire surrogates to manage Florida's uplands? A review. Florida Scientist 73:147-174.

* Summary:

Mechanical treatments and herbicide often accelerated vegetation structure changes, but ecological benefits were generally greatest when they were combined with fire. Soil disturbances, weedy species increases, and rapid hardwood resprouting were sometimes problems with mechanical treatments. Fire itself was crucial for maintenance of individual species and species diversity. When feasible, mechanical and herbicide treatments should be used as pretreatments for fire rather than as fire surrogates. Managers should segue to fire-only approaches as soon as possible.

* Substantive Comment:

(Used in support of other comments). One of many papers indicating that natural fire, or in this case prescribed fire, is the ecologically correct and natural method for the management of xeric upland habitats. The DAEIS is completely inadequate in sufficiently characterizing ecosystems and managing natural areas within the CFPD.

Meyerson, Laura A., et al. 2005. Aggregate measures of ecosystem services, can we take the pulse of nature. Front Ecol Environ 2005; 3(1): 56-59.

* Summary:

Stresses the imperativeness of "ecosystem services" as essential to human well-being and that such services provide life support for the human population. Concludes that "quantifying and monitoring the flows of ecosystem services is critical", and that "quantification of ecosystem services and communication of the information to decision makers and the public is critical to the responsible and sustainable management of natural resources."

* Substantive Comment:

3PR questions the adequacy of the environmental analyses in the DAEIS, because it fails to consider the "essential life support" value of the extensive natural ecosystems which large-scale phosphate strip mining destroys. It has not quantified, nor does it provide any direction for the adequate protection and monitoring of "ecosystem services" within the CFPD which are essential to both humans and the environment.

Naeem, Shahid et al. 1999. Biodiversity of Ecosystem Functioning: Maintaining Natural Life Support Processes. Issues in Ecology. No. 4, Fall 1999.

* Summary:

On of the most conspicuous aspects of contemporary global change is the rapid decline of the diversity of the Earth's essential ecosystems.

* Substantive Comment:

3PR objects and questions the adequacy of the environmental analyses and adequacy of the information in the DAEIS, because it does no consider the ALL IMPORTANT subject of "biodiversity". the fact that humans need healthy ecosystems for their continued existence, and the phosphate strip mining may be the largest single contributor to the destruction of genetic diversity and the environment in central Florida. NEPA's charter of "*Protection of the Environment*" is all but ignored in the DAIES.

Orzell, Steve L., and Bridges, Edwin L. 2006. Species Composition and Environmental Characteristics of Florida Dry Prairies from the Kissimmee River Region of South-Central Florida. Avon Park Air Force Range, Environmental Flight. Proc. Fla. Dry Prairie conf.

* Summary:

Species composition and environmental characteristics of prairies (dry prairie / palmetto / pineland) within the Kissimmee River region. Six community types were recognized and characterized: dry-mesic, mesic, wet-mesic spodic, wet-mesic, acidic wet, wet-mesic alfic and calcareous wet prairies. The latter two represent previously unrecognized community types in south-central Florida. Overall, 269 vascular plant taxa were recognized. Species richness was measured, and soils and soils horizons were identified and name using hydrologic modifiers, then measured, and characterized for each community type. Quantitative vegetation sampling and multivariate statistical analysis was conducted for vegetation classification and ordination. Community analysis involved Canonical Correspondence Analysis (CCA). Soils were analyzed using 38 variables, including 33 environmental/physical/chemical attributes.

* Substantive Comment:

3PR questions the adequacy of the environmental analyses in the DAEIS, because it fails to include this landmark central Florida research, examines the highly precise relationship between individual species and their specific soils and vegetative community type, in evaluation of the environmental impacts of phosphate strip mining, and in it decision-making for "*Protection of the Environment*", which is the NEPA purpose. Orzell and Bridges clearly established the existence of a high degree of soil and hydrologic specificity for native dry prairie plant species. Although the study was conducted east of the Lake Wales Ridge in the Osceola Plain and Okeechobee Plain, the ecosystems and environmental conditions which were examined in the study

area are very similar to those in the southern half of the CFPD. The study is widely known and adopted by Florida plant ecologists and used by federal land managers in the conservation of important, often very large federal reserves and properties.

3PR further questions the adequacy of the environmental analyses in the DAEIS, because the results of other highly important, very relevant landmark ecological studies were not considered in its development, and because expert regional restoration and conservation scientists such as those at nearby federal institutions such as the Natural Resources Flight of the Avon Park Air Force Range and Archbold Biological Station (the premier research biological research institution in Florida), were not "solicited" and engaged for consultation, asked to provide relevant research, or retained to conduct much-needed site-specific ecosystem analyses in the CFPD, particularly in those regions planned for destruction by the phosphate strip mining industry. Additionally, the analyses provided in the document insufficiently characterizes the cumulative impacts to these rapidly dwindling communities, which are all but extinct in some cases, and does not, with particularity and specificity, address their ecological sensitivity, as required in order to fulfill the stated purpose of NEPA which is "*Protection of the Environment*". 3PR contends that the DAEIS is particularly insufficient and inaccurate because it does specifically include analyses of the dry prairie (flatwoods, pine/palmetto flatwoods) vegetative communities that will be lost to phosphate strip mining mainly in the southern half of the CFPD. It is further insufficient because scientific research indicates a strong correlation to native plant species and highly specific natural soil types, which indicates that the destruction of these communities, and the ecosystems of which they are an integral part, will be permanent. Also see Cole et al 1994.

Palmer, Margaret A., et al. 2005. Ecological science and sustainability for the 21st century. Front Ecol Environ 2005; 3(1): 4-11.

* Summary:

Ecological science has contributed greatly to our understanding of the natural world and the impact of humans on that world. Now, we need to refocus the discipline towards research that ensures a future in which natural systems and the humans they include coexist on a more sustainable planet. Acknowledging that managed ecosystems and intensive exploitation of resources define our future, ecologists must play a greatly expanded role in communicating their research and influencing policy and decisions that affect the environment. To accomplish this, they will have to forge partnerships at scales and in forms they have not traditionally used. These alliances must act within three visionary areas: enhancing the extent to which decisions are ecologically informed; advancing innovative ecological research directed at the sustainability of the planet; and stimulating cultural changes within the science itself, thereby building a forward-looking and international ecology. We recommend: (1) a research initiative to enhance research project development, facilitate large-scale experiments and data collection, and link science to solutions; (2) procedures that will improve interactions among researchers, managers, and decision makers; and (3) efforts to build public understanding of the links between ecosystem services and humans.

* Substantive Comment:

3PR questions the adequacy of the environmental analyses and the accuracy of information in the DAEIS, because the document represents a failure in the scientific process. This research clearly establishes

the need for better research initiatives, and improvement between the interactions of researchers and decision makers. For many sections of the DAEIS it is difficult to determine which information or position to evaluate and comment upon. Clarity is lacking, objectivity is lacking, scientific qualification is lacking, and there are many opposing statements.

* Recommendation:

The DAEIS should be rejected and completely rewritten, this time employing "independent" scientific authorities and credible research institutions to provide scientific information, analyses, and required research. "Objective" public involvement needs be much greater, and information and research need to be solicited from qualified sources. Many highly important cumulative analyses are needed in order to resolve the plethora of important, unresolved concerns relating to the extensive negative impacts of large-scale phosphate strip mining and its associated industries.

Pfeffer, W.T., Harper, J.T., O'Neel, S. 2008. "Kinematic Constraints on Glacier Contributions to 21st-Century Sea-Level Rise". Science 321 (5894): 1340–3.

* Summary:

Analyzes global warming and sea level rise (SLR).

* Substantive Comment:

(See CHNEP. 2010, above).

Rau, John G. and Wooten, David C. 1980. Environmental Impact Analysis Handbook. McGraw-Hill, New York. 737pp.

* Summary:

This publication has long been a "standard" for applying the NEPA EIS environmental assessment process, and is designed to "provide environmental planners, analysts, and decision-makers with specific techniques and tools that can be used to assess and predict the environmental impact of projects." It provides a very thorough and cohesive framework for evaluating the environmental impacts of large projects, and also clearly explains sound principals of ecological evaluation and decision making. It is cited and used by the Bureau of Land Management (BLM) and other federal agencies. The methodologies, procedures, and scientific determination presented in this handbook were specifically developed for NEPA environmental analyses.

* Substantive Comment:

The DAEIS is inadequate and inaccurate because it did not consider the important scientific literature and guide to the NEPA process. The "Environmental Impact Analysis Handbook" specifically identifies and discusses significant environmental issues directly relevant to the type of impacts caused by phosphate strip mining. It should have been relied upon and referenced extensively in the development and decision-making of the DAEIS. Instead of following the standard procedures and analyses contained in this handbook, which is used throughout the U.S., its territories, and possessions, the DAEIS disproportionately favors the representations and proposed methodologies of the Applicants.

Reid, K. et al. 2010. Krill population dynamics at South Georgia: implications for ecosystem-based fisheries management. Marine Ecology-progress Series - MAR ECOL-PROGR SER, vol. 399, pp. 243-252.

* Summary:

Analysis of Krill-based food web in Antarctica. Krill populations down by more than 80% due to global warming effect on sea ice plankton.

* Substantive Comment:

(See CHENP 2010 reference, and comment).

Ross et al. 1997/9. FIPR Hydrologic Model, Parts III & IV: SWFWMD. For, the Florida Institute of Phosphate Research. By, Dept. of Geology, Univ. of S. Fla.

* Summary:

Describes the application of FHM to the SWFWMD data base. Provides various tables, including Land Use Attributes for a Generalized GIS Coverage of Land Use which correlates FLUCCS codes and descriptions to several hydrologic factors, such as "Plant ET Coeff".

"The plant ET coefficient is used in the integration to modify the remaining potential ET after all surface water ET fluxes are determined. The plant ET coefficient limits the plant ET in the ground water based on the vegetative land cover. Plants that transpire very little will require a plant ET coefficient much less than one. Plants that readily transpire at the potential given the proximity of the water table within the root zone water will have a plant ET coefficient close to one. Urban areas may obviously use plant coefficients near zero. The limits of the plant ET coefficient are between 0.0 and 1.0."

* Substantive Comment:

(None) [Used as data source: See Table 3].

Smith et al. 2006. Eutrophication of freshwater and marine ecosystems. Limnol. Oceanogr., 51(1, part 2), 2006, 351-355.

* Summary:

Nutrient enrichment of aquatic ecosystems typically results in significant alterations in biogeochemical cycling over both space and time. Concludes that it has been clearly established that two primary nutrients (P and N) can regulate aquatic primary productivity in most lakes and coastal marine ecosystems, although the actual response of primary producers to N and P enrichment can be modified by factors such as light limitation, hydrology, and grazing. The management of nutrient loading thus can be expected to remain a keystone to maintaining desirable quality in our surface waters. Echoes the conclusion of Schindler (2006) that despite these very significant advances, eutrophication remains one of the foremost problems in protecting freshwater and coastal marine ecosystems.

* Substantive Comment:

3PR questions the adequacy of the environmental analyses and accuracy of the information in the DAEIS, because the eutrophication of aquatic systems is a very serious issue and concern which has been correlated to increases in phosphorus (P) and nitrogen (N). Some of the substrates with which the phosphate strip mining industry replace the native soils and landscapes are high in phosphorous. This issue is a potential concern which relates to the on-site environment of phosphate lands after mining, but most significantly to offsite destinations via drainage, regular discharges, spills, and other transport mechanisms. Elevated

phosphorous in the Peace River, as compared to historic values, has been a serious problem in the past. The downstream destinations of Charlotte, Lee, and Sarasota counties are of particular concern due to their large coastal populations and high property values.

Stockwell, Heather G., Lyman, Gary H., Waltz, Julie and Peters, John T. 1988. Lung Cancer in Florida, Risks Associated with Residence in the Central Florida Phosphate Mining Region. Am. J. Epidemiol. (1988) 128 (1): 78-84.

* Summary:

This research was a case-control study that included 25,398 cases of lung cancer among Florida residents. It was conducted to determine if residence in the central Florida phosphate mining region was associated with an increased risk of lung cancer. A twofold increase in lung cancer risk was observed among male nonsmokers who lived in the study area. Risks were elevated for all major lung cancer cell types.

* Substantive Comment:

3PR questions the adequacy of the environmental analyses of the DAEIS because the document fails to appropriately evaluate low-level radiation levels which may be increased as a result of phosphate mining and other related processes and activities. The DAEIS fails to ensure that this phenomenon does not present risks and threats to public health, wildlife, and the environment. Other research also establishes that elevated low-level radiation exists within the CFPD, and potentially in association with some phosphate products, such as fertilizers, as well.

* Recommendation:

The public and environmental health issue must be completely evaluated. Comprehensive analyses and epidemiological studies are needed before additional phosphate strip mining permits are considered. (See other comments involving the issue of elevated radiation risks).

USCCR (U.S. Commission on Civil Rights). 2003. Not in My Backyard: Executive Order 12898 and Title VI as Tools for Achieving Environmental Justice. Washington, DC.

* Summary:

Details the problems of discrimination and government negligence where protecting the people of minority and low-income communities (populations), and explains the duties and requirements of federal agencies to comply with all laws and mandates (such Executive Order 12898) in protecting such disadvantaged classes.

* Substantive Comment:

When protection of the environment is concerned, federal agencies are required to conduct studies to determine the needs of minority communities and low-income communities, and to provide consideration through NEPA in federal actions. There is no mention of this publication, or of the "Commission on Civil Rights" in the DAEIS. The scant discussion of "Environmental Justice" in Chapter 1.7 of the DAEIS is inappropriate, inaccurate, and completely inadequate to address the concerns of the disadvantaged classes of Hardee and DeSoto counties (as detailed in previous 3PR comments).

3279 **USDA. 1990. Soil Survey of Polk County, Florida.** U.S. Dept. of Agriculture. Natural Resources
3280 Conservation Service (NRCS).
3281
3282 * Summary:
3283 Soil Survey of Polk County, Florida. Hard Copy.
3284 * Substantive Comment:
3285 (Use as general reference only).
3286
3287 **USDA. 2012. Federal Noxious Weed List.** U.S. Department of Agriculture (USDA/APHIS), effective
3288 December 10, 2010, updated February 1, 2012.
3289
3290 * Summary:
3291 Contains the current (as of Feb. 1, 2012) list of federally listed noxious plant species. The National
3292 Invasive Species Council was created by: "Executive Order 13112 On Feb 3, 1999, Executive Order 13112
3293 was signed establishing the National Invasive Species Council. The Executive Order requires that a Council of
3294 Departments dealing with invasive species be created."
3295 * Substantive Comment:
3296 In addition to several other noxious species which colonize "reclaimed" land, this list contains
3297 "cogongrass" (*Imperata cylindrica*).
3298
3299 **USDA. 2012a. National Soil Survey Handbook (NSSH),** title 430-VI. U.S. Department of Agriculture, Natural
3300 Resources Conservation Service (NRCS): <http://soils.usda.gov/technical/handbook/>. Accessed 24-July-2012.
3301
3302 * Summary:
3303 Provides new information about soils properties and qualities including the implementation of new
3304 engineering criteria which has resulted in extensive changes in hydrologic group designations within the CFPD,
3305 specifically involving the "splitting out" of many A/D hydrologic group soils polygons from B/D polygons.
3306 * Substantive Comment:
3307 (no comment is necessary, the information in the handbook is simply needed for discussions).
3308
3309 **USDA. 2012b. Detailed Soil Survey for Hardee County - GIS Shapefile Data.** U.S. Department of
3310 Agriculture, Natural Resources Conservation Service (NRCS). Soil Data Mart Database. Accessed: 24-July-
3311 2012.
3312
3313 **USEPA. 1997. Interim Final Guidance For Incorporating Environmental Justice Concerns In EPA's NEPA**
3314 **Compliance Analyses.** USEPA.
3315
3316 * Summary:
3317 EISs are required to be broad in scope, addressing the full range of potential effects of the proposed
3318 action on human health and the environment. Regulations established by both the Council on Environmental
3319 Quality (CEQ) and EPA require that socioeconomic impacts associated with significant physical environmental
3320 impacts be addressed in the EIS. This guidance highlights important ways in which EPA-prepared NEPA
3321 documentation may help to identify and address ENVIRONMENTAL JUSTICE concerns.
3322 * Substantive Comment:

3323 3PR questions the validity of the DAEIS, because it is evident that the rights of citizens of the low-
3324 income and minority communities in DeSoto and Hardee counties have not been properly protected, and they
3325 have not been appropriately informed as to the impacts that area-wide phosphate strip mining will have on their
3326 lives and communities. Clearly indicates that Environmental Justice is to be administered at the "Community"
3327 level. Also, see 3PR's previous, primary Environmental Justice comments.

3328
3329 **USEPA. 2010. EPA's Action Development Process, Interim Guidance on Considering Environmental Justice**
3330 **During the Development of an Action.** USEPA.
3331

3332 * Summary:

3333 Provides list of steps, definitions, and explanations for considering "Environmental Justice" during the
3334 development of an action. Explicitly integrates Environmental Justice considerations into the fabric of EPA's
3335 ADP from rule inception through all the stages leading to promulgation and implementation. Provides
3336 additional information and decision-making processes relating to Environmental Justice concerns during the
3337 development of an action.

3338 * Substantive Comment:

3339 3PR questions the validity of the DAEIS, because it is evident that the rights of citizens of the low-
3340 income and minority communities in DeSoto and Hardee counties have not been properly protected, and they
3341 have not been appropriately informed as to the impacts of area-wide phosphate strip mining will have on their
3342 lives and communities. Clearly indicates that Environmental Justice is to be administered at the "Community"
3343 level. Also, see 3PR's previous, primary Environmental Justice comments.

3344
3345 **White, W. A. 1970. The geomorphology of the Florida peninsula.** Fla. Dept. Nat. Resour., Bur. Geol. Bull.
3346 51:1-164.
3347

3348 * Summary:

3349 General mapping of the physiographic features and regions of peninsula Florida. Universally used as a
3350 standard.

3351 * Substantive Comment:

3352 Indicated the physiographic complexity of west-central Florida. It has been extremely well established
3353 that endemism and ecological uniqueness is strongly related to geomorphologic complexity.

3PR FINAL RECOMMENDATION

3PR finds with strong and reasonable basis that the DAEIS is not consistent with the NEPA purpose of "*Protection of the Environment*". The many deficiencies identified through 3PR's foregoing comments, the gross inadequacies in the environmental analyses, and problems with the accuracy of information, make the DAEIS unfit for public review and comment.

The DAEIS should be rejected in its entirety and replaced by a much more concise and complete document which is based entirely on objective, rational, and complete scientific analyses. A review and comment period of at least 12 months should be provided. It is imperative that notifications and public involvement be greatly expanded and improved in terms of informing and educating the public concerning the varied impacts of phosphate strip mining. In order for "fair" review to take place, it is also essential that interested parties and potential reviewers be provided: (1) access to the four proposed phosphate strip mine properties so that the information and assertions of the Applicants may be verified; (2) all referenced and related documents, communications, and resources consulted or relied upon (in digital formats); that interactions between the USCOE and the Applicants take place only in a public forum, or that complete records of such communications be recorded and immediately made available for public viewing.

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Appendix A:

Comment and Response Tables

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Comment Source	Comments/Comment Summaries	Comment Responses
Dennis Mader, 3PR	The AEIS does not comply with the requirements of NEPA.	As noted in Section 1.4 of the Draft and Final AEIS, the objectives of the AEIS are to analyze the direct, indirect and cumulative effects associated with the mine permit applications and alternatives to the requested permit actions. Section 1.4 also notes that "the over-arching goal of this AEIS is to support regulatory decision to be made by the USACE and other agencies..." Those regulatory decisions include requests to discharge dredge or fill material in Waters of the U.S. regulated under the Clean Water Act. In considering the permit applications, the USACE seeks to protect the Nation's aquatic resources, balance the reasonably foreseeable benefits and detriments of the project projects, and make permit decisions that recognize the values of the Nation's aquatic ecosystems to the general public. Chapter 1 has been revised to more clearly link the USACE's purpose and need in preparing the AEIS to its goals and objectives.
	In general, 3PR contends that the environmental analysis is so highly inadequate, inaccurate, and in many instances misleading that the DAEIS should be completely rejected in favor of the development of a new, more objective, complete, reasonable, clear and concise document which provides the meaningful and measurable directives needed to protect west-central Florida from the diverse negative impacts associated with phosphate strip mining.	Included in summary above.
	3PR's comments, objections, and recommendations are based on the scientific knowledge and observations of regional experts, published scientific literature developed by regional environmental experts, and data and analyses developed by, and freely available from, public sources. 3PR has provided facts which unequivocally demonstrate that the DAEIS is insufficient and inadequate for its legally required purpose of "Protection of the Environment". 40 CFR. 1502.9 Draft, final, and supplemental statements. Except for proposals for legislation as provided in Sec. 1506.8 environmental impact statements shall be prepared in two stages and may be supplemented. (a) Draft environmental impact statements shall be prepared in accordance with the scope decided upon in the scoping process. The lead agency shall work with the cooperating agencies and shall obtain comments as required in Part 1503 of this chapter. The draft statement must fulfill and satisfy to the fullest extent possible the requirements established for final statements in section 102(2)(C) of the Act. If a draft statement is so inadequate as to preclude meaningful analysis, the agency shall prepare and circulate a revised draft of the appropriate portion. The agency shall make every effort to disclose and discuss at appropriate points in the draft statement all major points of view on the environmental impacts of the alternatives including the proposed action.	Included in summary above.

	The purpose and need statement for the AEIS is incorrect.	In accordance with the National Environmental Policy Act (NEPA), an Environmental Impact Statement (EIS) “shall briefly specify the underlying purpose and need to which the agency is responding” (40 Code of Federal Regulations 1502.13). The purpose and need statement is required to be a description of the purpose and need for the proposed project, which has been clarified in Section 1.2 and includes a description of the USACE'S basic and overall project purpose, the public need, and the Applicants' purpose and need.
	3PR objects to the "purpose and need" as stated in the DAEIS. "The Applicants' purpose and need forms the basis for the alternatives analysis. The purpose and need for an Environmental Impact Statement is "Protection of the Environment" in federal actions. Nowhere is this NEPA directive found in the DAEIS. The position taken by the USCOE is inconsistent with federal law, and has the effect not only of promoting phosphate strip mining, but to virtually assure and predetermine that alternatives proposed by the Applicants are approved (permitted). This position taken by the USCOE effectively excludes Alternative-1 ("No Action" / "no permit"). It is clear that all of the other alternatives are merely additional scenarios acceptable to the Applicants. In actuality, NEPA requires that "the agency" propose the "alternatives, including the proposed action", not the Applicants.	Included in summary above.
	The "Purpose and Need" for the AEIS should be changed to: "The purpose of the proposed action is "Protection of the Environment" via comprehensive analysis of the direct and cumulative environmental impacts of phosphate strip mining in the CFPD, and assuring the protection the natural environmental, public health safety, and the conservation of water and air resources in considering federal permit applications."	Included in summary above.
	The DAEIS is inappropriate in that it mostly avoids the "Purpose" for issuing an Environmental Impact Statement under NEPA, which is "Protection of the Environment". 3PR perceives that the DAEIS disproportionately favors the desires and positions of the Applicants throughout: which is to strip mine nearly every available acre!	Included in summary above.
	The AEIS is too long, the time to comment was too short, and the information in the document is incorrect or inadequate.	The lengths of the Draft and Final AEISs are based on the potential environmental problems and the project size, in accordance with CEQ regulations. The comment period for the Draft AEIS was extended by the Corps to allow additional time for review and comment. The comments about the information in the document are acknowledged. The Corps considered such comments in its preparation of the Final AEIS, including updating and making corrections as necessary.

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	<p>The DAEIS is not adequate or accurate because it does not broadly consider readily available, independent, regionally qualified, third-party research, which is crucially relevant to the understanding and protection of the vast repositories of natural resources proposed for destruction as a result of phosphate strip mining. The DAEIS is further inadequate, incomplete, and generally deficient because the following important, relevant, or regionally applicable data, research, and analyses were omitted and therefore not considered in the decision-making processes during the development the document. In addition, it appears that a significant percentage of the resources cited in the DAEIS were obtained from the phosphate industry, phosphate industry contractors, or established phosphate mining proponents with vested interest in phosphate mining. In addition to the many other problems relating to the DAEIS source materials, which 3PR cited previously, the references cited infer that the base of information used for the DAEIS is not sufficiently impartial, neutral, or qualified.</p>	<p>Included in summary above.</p>
	<p>FDOT. 1990. Florida Land Use, Cover and Forms Classification System (Handbook), 3rd ed. Dept. of Trans. Surveying and Mapping, Geo. Mapping Sect., Tallahassee.</p> <p>* Summary: The standard land use and cover classification and mapping system used by government agencies, professionals, and scientists.</p> <p>* Substantive Comment: The FLUCCS system has been inaccurately and improperly applied in developing land use maps for the SWFWMD which includes the CFPD. FLUCCS requires that once land has been mined that it must be assigned a "mining" cover type and classification. The DAEIS is not accurate and is inadequate because it purports to have been based on SWFWMD land use mapping data which 3PR contends is in error and does not conform to the primary and universally used standard, which is FDOT 1990 FLUCCS.</p>	<p>Included in summary above.</p>
	<p>3PR has very significant concerns relating to the methodologies and results of the 2009 SWFWMD GIS mapping of District land uses purportedly using FLUCCS (1990) as found in 3PR's references below: 3PR finds that this mapping is in error in important ways, in that non-mining cover type designations have been used for areas of mining and areas of reclamation. FDOT FLUCCS 1990 requires that once an area has been mined, it remains a "160 Extractive" mining category, the best and highest category of which is "165 Reclaimed Land".</p> <p>3PR has unanswered questions concerning the application of FLUCCS categories in the mapping of existing land uses and cover types, and the way in which the system was applied in mapping post-mining cover.</p>	<p>Included in summary above.</p>

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	<p>Many of the referenced sources in the DAEIS originate from government agencies, the phosphate industry, the Phosphate Council, phosphate consultants, or phosphate industry proponents. These include permit applications, industrial-engineering-hydrology-mining studies, survey results, various data, website access links, and undocumented personal communications.</p> <p>Not included in the DAEIS references are the many important studies and research relating to (See enumerated issues starting on Page 7).</p>	Included in summary above.
	<p>The objectiveness, credibility and appropriateness of the comments and references which are included in an EIS, should be more carefully considered. One of the main problems with the DAEIS is that documentation/information is presented from government or scientific sources in one paragraph or on one page and then opposite statements are presented in/on the next which apparently emanate from industry-related sources. This is a recurring theme throughout the DAEIS. The USCOE should only include data, information, and analyses to which it is willing to attest as being the best possible scientific evidence, and the most honest and objective (untainted) available! An Environmental Impact Statement is a very important instrument designed to guide the permitting of large projects ensuring "Protection of the Environment". The document should not be used as a platform for presenting debate or opposing arguments. Often, 3PR could not identify the position of the agency in relation to important issues. Usually, only discussion, data, and results are presented, but without an affirmative conclusion and agency accepted determination.</p>	Included in summary above.
	<p>3PR questions the validity and intent of the DAEIS as a tool which furthers the interests of mankind. The document presents voluminous amounts of generic data, including many excerpts from public documents, some of which is appropriate, most of which is either inappropriate or unnecessary.</p>	Included in summary above.
	<p>3PR finds with strong and reasonable basis that the DAEIS is not consistent with the NEPA purpose of "Protection of the Environment". The many deficiencies identified through 3PR's foregoing comments, the gross inadequacies in the environmental analyses, and problems with the accuracy of information, make the DAEIS unfit for public review and comment.</p>	Included in summary above.
	<p>In the sections which follow, 3PR supports with sound and legal and scientific basis that the information provided in the DAEIS is generally inadequate and inaccurate for its intended purposes of "Protection of the Environment". 3PR considers that many statements and portions of the DAEIS consists merely of large volumes of pro forma data and cookie-cutter analyses which do not further the "understanding of environmental consequences, and take actions that protect, restore, and enhance the environment" as required by NEPA.</p>	Included in summary above.

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	<p>The DAEIS is insufficient and/or unsupported by independently developed, regionally relevant data and proper site-specific evaluations and research. Most sections are highly deficient and preclude meaningful review and comment. The content of the DAEIS appears to rely disproportionately on representations, data, and analyses obtained from the Applicants and/or other sources directly or indirectly related to the phosphate strip mining industry, such as The Phosphate Council. These interactions may be procedurally "technically" permissible? However, they greatly tarnish transparency in the NEPA process, and serve to erode the credibility of the DAEIS. Voluminous information, data, and analysis are provided in the DAEIS. However, in large part, the quality, appropriateness, and relevancy of the information are perceived by 3PR as grossly unacceptable. It appears that the DAEIS includes precisely the types and bulk of content that NEPA specifically warns not to include or indulge in: "Agencies shall focus on significant environmental issues and alternatives and shall reduce paperwork and the accumulation of extraneous background data. Statements shall be concise, clear, and to the point, and shall be supported by evidence that the agency has made the necessary environmental analyses". These points are more particularly described in later sections below.</p>	Included in summary above.
	<p>3PR questions and contends that the DAEIS promotes many positions for which there is intense and adamant disagreement among scientists and researchers who are "independent" of the phosphate industry, and its related agencies, consultants, attorneys and public relations personnel. Many of these disagreements have to do with the tremendous extent of wetlands, upland native ecosystems, and native biota historically destroyed by phosphate strip mining, and the fact that many of these systems can never, and have not, been replicated, replaced, or effectively restored to any reasonably viable or functional ecological systems, and that the native assets involved are essential to protect in trust for the future of humanity.</p> <p>The DAEIS almost completely omits and avoids the tremendous body of scientific literature and research data and analyses which show the negative impacts which phosphate strip mining and its related industries have imparted to native upland and wetlands ecosystems and biota, rivers, streams, estuaries and other aquatic resources, groundwater resources, surface water resources, aquifers, water quality, availability, and distribution, climate, community planning, and public health and safety, and many other areas of concern to the environment and the human population which depends upon it.</p>	Included in summary above.
	<p>Unfortunately, because of the completely inadequate amount of time provided by the USCOE/USEPA to obtain and comment on the contents of a 1,063 page report, 3PR can only respond on a few issues.</p>	Included in summary above.

	<p>3PR objects and questions the excessive length of the DAEIS, and to the completely insufficient 60- day time period allotted for review and comment. This restriction is both unreasonable and untenable for any person, any group, or any agency. The length, unnecessary complexity, and lack of clear succinctness, is inconsistent with NEPA, which requires that an EIS not just "generate paperwork", but that it should "reduce paperwork and the accumulation of extraneous background data". NEPA recommends that such documents be less than 150 pages long, or normally less than 300 pages for more complex proposals. The 1,063 page length of the DAEIS is highly excessive, and exceeds the maximum of these recommended standards by well over three fold. In effect, its extreme length and complexity precludes review and comment on all but a few of the important issues and, in so doing, violates the public trust, greatly diminishes public participation, and suppresses public scrutiny.</p>	Included in summary above.
	<p>Concerned citizens, and interested parties and organizations, have therefore been completely overwhelmed by the amount of documentation contained in these documents, and by the scope of the ancillary documents, research publications, regulations, and website materials which must also be collectively digested and considered in responding to the DAEIS.</p> <p>Because of the immense, once-in-history importance of the DAEIS, and consideration of the four expansive phosphate strip mining projects, 3PR is compelled to continue and thoroughly articulate this significant issue, and further object to the unnecessary length and complexity of the DAEIS (included its related documents and sources). The public is entitled to a fair and liberal opportunity to thoroughly evaluate the DAEIS, because "public scrutiny is essential to implementing NEPA", and because the resulting Area-wide EIS will in large part determine the destiny of an entire region and ultimately affect the lives of millions of people. As phosphate strip mining has done historically, it will most certainly leave a legacy of environmental and economic liability, in perpetuity, resulting from its diverse and comprehensive negative environmental impacts. This is true because phosphate strip mining is non-renewable, non-sustainable. It is a here-then-gone, purely exploitive industry, which leaves an extensively altered and often abandoned, or forgotten, alien landscape in its wake.</p>	Included in summary above.

	<p>A thorough review of the DAEIS document alone, not including the time and resources needed to verify any of the data or analyses, would require many months. Advertising for and contracting professional consultants capable of performing a thorough review of such a vast and diverse region, involving such a huge number of severe cumulative impacts and other issues, requires considerable time in itself. A 60-day comment timeframe may be acceptable for a very small, single project, which does not involve native ecosystems and water resources impacts, but is completely inadequate for an action involving a geographic area as great as that of the CFPD, which considers such a large range of extreme environmental impacts, and a report of such magnitude, complexity, and length as the DAEIS.</p>	Included in summary above.
	<p>The DAEIS is a technical document involving terminology, data and analyses from many specialized, even unique fields of industry and science. Its development has taken the USCOE, its cooperating agencies, CH2M-Hill (one of largest industry-support consulting firms of its kind), other consultants and advisors, phosphate representatives and employees, and personnel from various agencies, many months to develop. Even if the resources of private sector organizations and government commenters were unlimited, it would be impossible for even a minimal review of the DAEIS in a just 60 days. In order to perform a review and comment on such a voluminous and technical document, and to actually verify some of the data and analyses provided, a much greater span of time would be required, including time for the field verifications, essential investigations, and other analyses necessary to generally evaluate and objectively verify the thousands of statements of the DAEIS, and the actual extent, attributes, and status of ecological/biological resources within the CFPD.</p>	Included in summary above.
	<p>In addition, the USCOE, almost simultaneously issued notice four individual and distinct mine permit applications which include impact areas totaling approximately 60,000 acres. These documents and related materials are individually voluminous and include many separate exhibits and appendices, and they are repeatedly referred to in the DAEIS. The effect of overlapping the DAEIS review with such vast libraries is that only the most minimal comments are possible</p>	Included in summary above.

	<p>The "Assessing Environmental Impact" section of The Environmental Impact Analysis Handbook (Rau & Wooten 1980) identifies several deficiencies in biotic impact assessment reporting which should be avoided:</p> <ul style="list-style-type: none"> (1) "Evasion of possible impacts and lack of their assessment." (2) "Omission of pertinent information necessary for unbiased evaluation of impacts." (3) "Inadequate descriptions of adverse impacts." (4) "A plethora of biotic data or information without interpretation or correlation with possible impacts." <p>The DAEIS is inadequate and inaccurate because it clearly contains and furthers the above listed deficiencies. 3PR specifically addresses these deficiencies and provides evidence and documentation of their existence and deleterious effects on the DAEIS throughout its comments.</p>	<p>Included in summary above.</p>
	<p>Rau, John G. and Wooten, David C. 1980. Environmental Impact Analysis Handbook. McGraw-Hill, New York. 737pp. * Summary: This publication has long been a "standard" for applying the NEPA EIS environmental assessment process, and is designed to "provide environmental planners, analysts, and decision-makers with specific techniques and tools that can be used to assess and predict the environmental impact of projects." It provides a very thorough and cohesive framework for evaluating the environmental impacts of large projects, and also clearly explains sound principals of ecological evaluation and decision making. It is cited and used by the Bureau of Land Management (BLM) and other federal agencies. The methodologies, procedures, and scientific determination presented in this handbook were specifically developed for NEPA environmental analyses.</p>	<p>Included in summary above.</p>
	<p>* Substantive Comment: The DAEIS is inadequate and inaccurate because it did not consider the important scientific literature and guide to the NEPA process. The "Environmental Impact Analysis Handbook" specifically identifies and discusses significant environmental issues directly relevant to the type of impacts caused by phosphate strip mining. It should have been relied upon and referenced extensively in the development and decision-making of the DAEIS. Instead of following the standard procedures and analyses contained in this handbook, which is used throughout the U.S., its territories, and possessions, the DAEIS disproportionately favors the representations and proposed methodologies of the Applicants.</p>	<p>part of above comment</p>

	<p>3PR objects and questions the excessive length of the DAEIS, and to the completely insufficient 60- day time period allotted for review and comment. This restriction is both unreasonable and untenable for any person, any group, or any agency. The length, unnecessary complexity, and lack of clear succinctness, is inconsistent with NEPA, which requires that an EIS not just "generate paperwork", but that it should "reduce paperwork and the accumulation of extraneous background data". NEPA recommends that such documents be less than 150 pages long, or normally less than 300 pages for more complex proposals. The 1,063 page length of the DAEIS is highly excessive, and exceeds the maximum of these recommended standards by well over three fold. In effect, its extreme length and complexity precludes review and comment on all but a few of the important issues and, in so doing, violates the public trust, greatly diminishes public participation, and suppresses public scrutiny.</p>	Included in summary above.
	<p>3PR questions the adequacy of the environmental analyses in the DAEIS, because Chapter 3.0 "Affected Environment" is entirely inconsistent with the requirements of NEPA.</p> <p>40 CFR 1502.15 Affected environment.</p> <p>"The environmental impact statement shall succinctly describe the environment of the area(s) to be affected or created by the alternatives under consideration. The descriptions shall be no longer than is necessary to understand the effects of the alternatives. Data and analyses in a statement shall be commensurate with the importance of the impact, with less important material summarized, consolidated, or simply referenced. Agencies shall avoid useless bulk in statements and shall concentrate effort and attention on important issues. Verbose descriptions of the affected environment are themselves no measure of the adequacy of an environmental impact statement."</p>	Included in summary above.
	<p>Nowhere is the "environment" of the CFPD or the four proposed phosphate strip mine projects "succinctly" described in ways which would allow a reviewer to "understand the effects of the alternatives". And, as detailed in the other comments of 3PR, the data and analyses are definitely not "commensurate with the importance of the impact".</p>	Included in summary above.

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	<p>As with all Chapters of the DAEIS, this section is difficult to follow and evaluate because of such erroneous statements as "The CFPD study area is characterized by prevailing flat terrain. Minimal aesthetic impact concerns are anticipated for any proposed new phosphate mines so long as adequate berms and setbacks or buffers are maintained." The CFPD contains most of the Polk Upland, which is largest upland physiographic province in central Florida, and is characterized as "uplands", "ridges" and "slopes". Positioned within this vast upland region, which has many broadly rolling hills, and riverine/palustrine valleys and ravines, are the even higher hills of the topographically contrasting Lakeland Ridge and Lake Henry Ridge, as well as several unnamed ridges and extensive, intermittent xeric upland areas, such as is found throughout western Manatee County, and along the banks of the Peace River and major creeks. A more appropriate statement for the DAEIS, which is "succinctly" accurate, would be "Phosphate strip mining destroys the historic aesthetic character of each community and region it mines by excavating the hills and valleys, and replacing them with new contours surrounding massively tall, geographically extensive, rectangular dams and impoundments containing inestimable volumes of waste clays."</p>	Included in summary above.
	<p>Much of DAEIS is composed mainly of "useless bulk" and its statements are generally inadequate and inappropriate in properly responding to NEPA requirement, because they do not responsibly characterize and evaluate the "Affected Environment" in a "succinct" manner. Also, they are very frequently contradictory.</p>	Included in summary above.
	<p>NEPA requires that the information in the DAEIS be clear and succinct, and with the most credible scientific foundations. Very few sections of the DAEIS meet any of these criteria, or other NEPA requirements.</p>	Included in summary above.
	<p>The DAEIS fails to communicate in every regard, through its exceedingly poor organization and lack of clarity and measurability, through inestimable numbers of errors, omissions, internal inconsistencies and improper content [incorporated here by reference: the DAEIS additional comments submitted collectively on behalf of Manasota-88, People for Protecting Peace River (3PR), Protect Our Watersheds (POW), Sierra Club Florida Phosphate Committee. The comments of which speak to many technical deficiencies of the document], and because it does not attempt to accommodate the general public through adhering to the NEPA requirements of concise and meaningful succinctness.</p>	Included in summary above.
	<p>The DAEIS is insufficient and inappropriate in its range of content. It includes many sections of irrelevant, superfluous, and unnecessary content. Federal law required the DAEIS be clear, concise, and condensed.</p>	Included in summary above.

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	<p>The DAEIS "omits" discussion of elevated radiation levels relating to phosphate strip mining, including potential threats to human health and safety, plants, animals (particularly birds), and to the general environment. It "omits" discussion of the extensive infestations of the noxious species known commonly as "Cogongrass" which is and will continue to have profound and wide-spread impacts on the environment and economy of west-central Florida, particularly in and around areas of the phosphate industry's "reclaimed" lands. It "omits" important research relevant to "Protection of the Environment" within the CFPD, and also proper evaluations and characterization of ecosystems and biota (see quotes in next paragraph) which are important to examine in order to assure public health and safety. It is "inadequate" in that through its omissions, and generally throughout its narratives, it does not clearly and completely describe the potential adverse impacts to the environment. In fact, these impacts should be clearly and prominently tabulated for the lay person to fully comprehend, because such is a primary purpose of NEPA through public involvement, public scrutiny, and Environmental Justice. Further, the DAEIS clearly consists of a "plethora" of data and information much if not most of which is not accompanied by clear correlations to the possible or probable negative impacts of phosphate strip mining. The DAEIS is therefore unacceptable and inappropriate in these regards.</p>	<p>Included in summary above.</p>
	<p>The DAEIS focuses almost exclusively on fulfilling the primary economic strategy of the phosphate industry, which has been, and continues to be, to mine every available acre, without adequately protecting the irreplaceable subtropical ecosystems and extensive water resources which is destroys, and without assuming responsibility for the long-term liabilities which fall on local communities. Phosphate strip mining provides the potential for far-reaching and pervasive impacts such as contamination of surface waters and groundwater, and generally elevated radiation levels. Avoided in the DAEIS are competent evaluations of ecological resources and forthright discussions and proposals for "Protection of the Environment" within the CFPD, which is the sole purpose of NEPA as set forth in 40 CFR 1500.1.</p>	<p>Included in summary above.</p>
	<p>The DAEIS should be rewritten to contain only data and scientifically supported descriptions of environmental resources and potential impacts. Some representations made in the document, such as inferring that mining will actually improve the site, are erroneous and greatly erode the credibility of DAEIS. Additionally, a very significant body of valuable "independent" scientific research exists which is not utilized or appropriately cited in the DAEIS.</p>	<p>Included in summary above.</p>

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	At a minimum, the DAEIS should include a comprehensive literature search, reviews, and independent biological evaluations and characterizations of ecosystems, vegetative communities, and other biota which occur within the CFPD (Palmer et al 2005). Without comprehensive and competent information there can be no analysis, and therefore no cumulative impact study.	Included in summary above.
	Instead of independent evaluations, the DAEIS relies very heavily on representations and analysis which appear to have been provided by the Applicants, phosphate industry agents, or other phosphate strip mining proponents such as The Phosphate Council. This is a conflict of interests.	Included in summary above.
	The DAEIS lacks specificity and measurability throughout, and is general unqualified because of inadequate, non-regionally-specific data and analyses, and "preparers" who lack adequate experience with the ecosystem and biota of west-central Florida. It does not provide adequate evaluations, conducted by objective, politically neutral third-party researchers, of the vast and irreplaceable natural resources proposed to be destroyed by mining.	Included in summary above.
	The process of preparing the DAEIS should have involved the development of high quality, site- specific, independently developed and objectively verifiable data, which should have been immediately made available for public scrutiny and certification.	Included in summary above.
	3PR questions the adequacy of the environmental analyses and accuracy of the information in the DAEIS, because it does not provide "accurate scientific analysis", "expert agency comments", but relies disproportionately on representations made by the Applicants. Representations made by the Applicants intrinsically further their needs, and consequently do not fulfill the NEPA purpose of "Protection of the Environment".	Included in summary above.
	3PR questions the adequacy of the scoping process for the DAEIS, because important relevant ecosystem research and analyses, as discussed and cited elsewhere herein, were not independently formulated and conducted specific to the ecosystems, environs, and biota found within the CFPD, particularly within the southern half of this area. Because of the immense size of the CFPD, and the intensity and indelibility of phosphate strip mining impacts, independent, objectively verifiable studies should have been conducted so that the immediate impacts, as well as the cumulative impacts of mining could be properly evaluated. However, this was not the case, as much of the important information which should have been "objective", and subjected to the "public scrutiny" as NEPA requires, appears merely to have been provided by the Applicants, their agents, or phosphate strip mining proponents.	Included in summary above.
	The scoping process was not conducted correctly.	Scoping for the AEIS was conducted in accordance with the appropriate regulations, including for noticing and for soliciting public comments. Details of the scoping process were provided in Chapter 1 of the Draft AEIS.

	<p>3PR questions the adequacy of environmental analyses and accuracy of the information upon which the DAEIS was based, because seemingly little effort was expended in locating and utilizing regional environmental experts and regionally relevant biological and ecological research published by prominent institutions conducting research in conservation biology in central Florida, such as the Archbold Biological Station, the University of Central Florida, the Natural Resources Flight of the Avon Park Bombing Range, and Tall Timbers Research Station. NEPA requires that appropriate information be solicited from the public. 40 CFR 1506.6 Public Involvement</p> <p>Agencies shall:</p> <p>(d) Solicit appropriate information from the public.</p>	Included in summary above.
	<p>3PR further questions the adequacy of the environmental analyses in the DAEIS, because the results of other highly important, very relevant landmark ecological studies were not considered in its development, and because expert regional restoration and conservation scientists such as those at nearby federal institutions such as the Natural Resources Flight of the Avon Park Air Force Range and Archbold Biological Station (the premier research biological research institution in Florida), were not "solicited" and engaged for consultation, asked to provide relevant research, or retained to conduct much-needed site-specific ecosystem analyses in the CFPD, particularly in those regions planned for destruction by the phosphate strip mining industry.</p>	Included in summary above.
	<p>3PR questions the adequacy of the scoping process for the DAEIS, because it did not sufficiently include involvement of well-known research institutions, regional ecologists, and sources of credible research, especially Archbold Biological Station (preeminent research center for conservation biology, plant ecology and restoration biology in central Florida), the Natural Resources Flight of the Avon Park Air Force Range (conducting federal research for large-scale ecosystem conservation land management involving many listed plants and animals native to central Florida), Center for Plant Conservation Network at Bok Tower Gardens (conducting extensive research relating to listed/endemic native plant relocations, reintroduction strategies, and endemic plant ecology), Tall Timbers (ecological, botanical, management, and forests research) and other central Florida biologists who have conducted independent ecosystems studies. Neither has their relevant published research been cited or considered.</p>	Included in summary above.

	<p>The DAEIS scoping meeting with the largest turnout reportedly had a significant number of attendees, most of whom were representatives of the phosphate industry or government personnel. Those with the greatest vested interests will always ensure that they are overrepresented. Meetings merely involving small developments, public parks, and local issues often generate much more involvement solely by newspaper advertising. Although the DAEIS and proposed mining operations will result in impacts to tens-of-thousands of acres, involving 6 counties, and 2 watersheds (which include an additional 2 counties), only very limited advertising was provided to the public, and with virtually no "real" characterization of the extreme scale of the proposed projects and magnitude of impacts to the environment and human society.</p>	<p>Included in summary above.</p>
	<p>Except for the select few who have visited active/inactive phosphate strip mines, or have per chance flown over such devastated regions in a plane or helicopter, the general public has no conception as to the degree and magnitude of the impacts, permanency, or associated long-term liabilities and human health risks. The extensive alterations to the Florida landscape which have already occurred within the CFPD are among the most prominent collection of land disturbance features visible from space. 3PR has no doubt that the advertising conducted for the scoping meetings and the narratives, figures, and exhibits of the DAEIS, were/are inadequate to educate the general public concerning the magnitude and impacts of strip mining in west-central Florida. A very large effort, much broader in scope and intensity, should have been made to educate and engage the general public on the very profound issue of regional-scale phosphate strip mining. Involvement in the initial scoping meetings for the DAEIS was therefore unnecessarily selective and restrictive, and constitutes a general public injustice.</p>	<p>Included in summary above.</p>
	<p>Although at least one scoping meeting reportedly hosted over 100 attendees, a large percentage of those present were, intrinsically, representatives of the phosphate industry and various assortments of government officials, agency personnel and assistants. The public has not been adequately noticed and appropriately educated as to the extent, value, complexity, and irreplaceability of the natural resources which may be destroyed by continued phosphate mining. Neither have they been appropriately informed in clear terms, which are meaningful to laypersons, as to the vast array of regional and global consequences of destroying a large percentage of west-central Florida merely for the short-term economic gain of external interests.</p>	<p>Included in summary above.</p>

	<p>3PR vehemently objects to the scoping process as providing any legitimate bases for the development of the AEIS under NEPA, because the data and analyses, recommendations, and opinions of independent scientists and environmental professionals were not properly considered or incorporated.</p> <p>3PR provided the results of qualified site specific environmental studies, which were summarily rejected without comment or explanation. 3PR provided these environmental analyses through its professional consultants, Winchester Environmental Associates, Inc. Several important primary concerns relating to phosphate strip mining were evaluated through on-site and offsite environmental analyses, including wetlands mitigation, wetland reclamation, endangered species, cumulative impacts, and downstream estuarine concerns. The lead scientist for this exercise is one the most experienced professional consultants in the region, and has qualified as an expert witness and testified in legal proceedings many times.</p>	Included in summary above.
	<p>Resistance to independent scientific information appears to be endemic to phosphate strip mine permitting procedures. However, such rejection of public involvement is diametrically inconsistent with the spirit and intent of NEPA and the public participation and involvement requirements guaranteed under the Act. Moreover, NEPA stresses that public scrutiny is essential to its fair implementation and sole mission of "Protection of the Environment". NEPA requires that agencies encourage participation at all levels and requests involvement and comments from the public, affirmatively soliciting comments from those persons or organizations which may be interested or affected.</p>	Included in summary above.
	<p>If important site-specific relevant research and information provided directly by the highly experienced and reputable representative of a prominent local professional consulting firm is not welcomed by the USCOE, then it is clear that no independent voices were to be considered in the scoping process.</p> <p>This single example is emblematic of the dreadful deficiencies of the scoping process and insincere efforts to claim public involvement and objectivity. This incident solidifies the appearance evident throughout the scoping process of near total reliance on information and representations provided by the Applicants and pro-mining interests.</p>	Included in summary above.

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	<p>The severe time limit restriction for the DAEIS review and comment has the effect of censuring and effectively precluding public involvement. The USCOE should have mailed every resident a succinct description of the proposed action, including simple summaries which explain the project and describe prior phosphate strip mining, in terms the layperson can understand, including a wide range of photos showing the impacts of phosphate mining from the air and ground, and listing and showing all environmental impacts and concerns. The public must be much more broadly and fully informed about phosphate strip mining so that communities will possess "real" information upon which to base their public involvement and their actions.</p>	Included in summary above.
	<p>Note: It seems important that these issues be addressed at public forums where regional experts have been invited to participate. NEPA requires that contributions to the EIS process be "solicited".</p>	Included in summary above.
	<p>3PR questions the adequacy of the environmental analyses contained in the DAEIS, because the NEPA "Public Involvement" requirements were not fulfilled. This may represent a special concern because, as detailed in previous sections of 3PR's comments, significant areas within the CFPD fall into low-income and/or minority dominated categories, suggesting the need for special public involvement considerations. The areas of compliance in question include:</p> <p>40 CFR 1506.6 Public involvement. Agencies shall:</p> <p>(b) ...In the case of an action with effects primarily of local concern the notice may include: (v) Notice through other local media.</p> <p>(vi) Notice to potentially interested community organizations including small business associations.</p> <p>(vii) Publication in newsletters that may be expected to reach potentially interested persons.</p> <p>(viii) Direct mailing to owners and occupants of nearby or affected property.</p> <p>(d) Solicit appropriate information from the public.</p>	Included in summary above.
	<p>3PR is not aware of the utilization of: the predominant television channels which are viewed locally within the CFPD, notices to churches within the CFPD, minority businesses and business associations within the CFPD, direct mailings to owners and occupants "nearby", but external to, the CFPD, or "affected" properties within or external to the CFPD.</p>	Included in summary above.
	<p>The effects of area-wide phosphate strip mining extend far beyond the boundaries of the individual mine project, or the CFPD, and the public involvement process should have been much more greatly expanded and comprehensive. Again, low-income and minority populations, including non-English speaking, should be entitled to an especially strong effort to educate them as to the potential impacts of area-wide phosphate strip mining on the future of their communities, livelihoods, and futures.</p>	Included in summary above.

	<p>3PR considers that the AEIS process has been inadequate in effectively soliciting, advertising, and recruiting the independent expert assistance and judgments which are necessary in order to ensure adequate "public scrutiny". NEPA requires that "Agencies shall: Solicit appropriate information from the public". The DAEIS is therefore not founded on "decisions that are based on understanding of environmental consequences, and take actions that protect, restore, and enhance the environment." NEPA required that "Environmental impact statements shall be concise, clear, and to the point, and shall be supported by evidence that agencies have made the necessary environmental analyses." Many sections of the DAEIS present no clear point, and are not measurable, or supported by data and analyses.</p>	Included in summary above.
	<p>It is imperative that notifications and public involvement be greatly expanded and improved in terms of informing and educating the public concerning the varied impacts of phosphate strip mining.</p>	Included in summary above.
	<p>3PR questions the adequacy of the DAEIS development processes, because it did not adequately solicit for public input and participation. Regionally recognized, "independent" biological and conservation research institutions and wildlife experts were not sought out for assistance or consulted. Its meetings were not widely advertised in ways that would adequately, accurately, and appropriately characterize and stress the tremendous scope and importance of the proposal, and its potential for long-term negative impacts to human society and the environment. Public notices and advertising did not adequately or appropriately characterize phosphate strip mining and its demonstrated potential for diverse negative impacts to the environment and human society. Additionally, the DAEIS development efforts did not adequately inform the public, with concise descriptions, photos, and through multimedia, TV, and broad Internet advertising, which are the "media of today", as to the condition of previously mined properties. There was no reasonable effort made to inform the general public concerning phosphate strip mining, to depict or characterize their operations and activities, or make them aware of the condition, or uses, or other important issues relating to previously mined lands. An effective and comprehensive educational process is therefore essential in order for the general public is to gain a reasonable level of understanding, and conceptualize the magnitude and potential for negative impacts which phosphate strip mining will have on their communities. Tours of the landscape surrounding Mulberry and Ft. Meade, and the phosphate industrial processing district along SR-60 between Bartow and Mulberry would be very educational.</p>	Included in summary above.

	<p>The Corps did not adequately coordinate with state and local agencies in the development of the Draft AEIS, including consideration of state and local requirements.</p>	<p>As described in the Draft AEIS, the Florida Department of Environmental Protection was a cooperating agency for the AEIS. In addition, most of the state and local governments and agencies with an interest in the four proposed actions were considered to be 'participating agencies' for the AEIS. The Corps met with state and local agency staff on several occasions, including for update meetings. The Corps considered comments received from state and local governments and agencies concerning inconsistencies with state and local regulations in preparing the Final AEIS. Sec. 152.25(b), of the CEQ regulations for implementing NEPA, states that a draft environmental impact statement will list all federal permits, licenses, and other entitlements that must be obtained in implementing a proposed project and . These requirements, as well as other federal regulations where compliance is required are identified in Chapter 6.</p>
	<p>Additionally, 3PR questions the adequacy of the environmental analyses and accuracy of the information in the DAEIS, because NEPA requires coordination and consistency with the laws and future planning strategies of state and local governments. The State of Florida Comprehensive Plan requires that. Florida Statutes: 187.201(13)(b) Policy 5: Prohibit resource extraction which will result in an adverse effect on environmentally sensitive areas of the state which cannot be restored. As detailed elsewhere in 3PR's comments, throughout the DAEIS insufficient evidence of efforts to significantly coordinate with state and local agencies in terms of assuring consistency with their laws, regulations, and adopted land use or agency policy plans. In comparing the policies of the State Comprehensive Plan, Central Florida Regional Policy Plan, and Local Comprehensive Plans of the counties being impacted by phosphate strip mining, many inconsistencies and direct conflicts may be found.</p>	<p>Included in summary above.</p>
	<p>There are very large numbers of state, regional, and local laws and regulations with which the provisions of the DAEIS are not consistent.</p>	<p>Included in summary above.</p>
	<p>3PR also questions the degree to which the USCOE specially cooperated with local governments as required by NEPA.</p>	<p>Included in summary above.</p>

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	<p>The Peace River Manasota Regional Water Supply Authority (PRMRWSA) possesses a high level of regional scientific expertise in managing water resources. They are also the single most important agency providing water to several large populations in southwest central Florida. Although the PRMRWSA was referenced in several sections of the DAEIS, it does not appear as though adequate involvement has not been solicited from this agency. NEPA requires appropriate information be solicited from the public. Certainly the PRMRWSA possess relevant information, data, and analyses which should have been more thoroughly considered in formulating the DAEIS where potential impacts to the water resources of south-central Florida (Charlotte, DeSoto, Lee and Sarasota counties) are concerned.</p>	<p>Included in summary above.</p>
	<p>HCP&D. 2003. Draft - Staff Report for IMC -Phosphates Company Ona Mine (CFRPC: DRI 203-82). Hardee County, Board of County Commissioners, Hardee County Planning and Development. Wauchula, Florida.</p> <p>* Summary: This draft staff report characterizes the Ona Mine site and details many of the issues which were considered relevant to local, state, and federal law at the time. The document provides summaries and discussions, and detailed treatments and analyses of each individual significant issue relating to phosphate strip mining at the project site. The data and analyses were developed by regional experts in the biological sciences, and in the fields of hydrology, economics, and land use planning.</p>	<p>Included in summary above.</p>
	<p>Substantive Comment: Although directly relevant research and analysis, authored by Hardee County Local Government is readily available as a public record, it was not incorporated into the DAEIS or used as a source of information. The following sections of NEPA, in order to accomplish its purpose of "protection of the environment", require coordination and cooperation with local governments during the development of the EIS. The only references in the DAEIS to the Hardee County Comprehensive plan, which contains numerous goals, objectives, and policies relating to mining, economy, and protection of the environment, are misleading references to the Mining Overlay Map as an indication of mining suitability, which it most definitely is not, but merely a map based on mining company ownership, and not promulgated based on any actual data and analysis which would suggest that the mapped regions is/are appropriate for phosphate strip mining, other than for being located within the CFPD. However, NEPA requires that the DAEIS must include discussions of "possible conflicts between the proposed action and the objectives of local land use plans.</p>	<p>part of comment above</p>

	<p>The DAEIS is clearly inadequate and inaccurate, in that none of these NEPA requirements for "protection of the environment" are satisfied, that is, Hardee County Comprehensive Plan land use plan goals, objectives, and policies were not discussed.</p> <p>40 CFR 1502.5 Timing</p> <p>(b) For applications to the agency appropriate environmental assessments or statements shall be commenced no later than immediately after the application is received. Federal agencies are encouraged to begin preparation of such assessments or statements earlier, preferably jointly with applicable State or local agencies.</p> <p>40 CFR 1502.16 Environmental consequences</p> <p>This section forms the scientific and analytic basis for the comparisons under Sec. 1502.14.</p> <p>... It shall include discussion of:</p> <p>(c) Possible conflicts between the proposed action and the objectives of Federal, regional, State, and local (and in the case of a reservation, Indian tribe) land use plans, policies and controls for the area concerned.</p>	Included in summary above.
	The public does not have access to the references and other information used.	Copies of the references and other data used for the Draft and Final AEISs were and are available by request from the Corps.
	<p>Larger concerns relate to the fact that accessibility to copies of many of the papers is difficult and expensive, and in some cases, not feasible because the document or resource is not publicly or conveniently available. If there is a consolidated source of these references and sources of information of which 3PR, due to some oversight, is not aware, then please disregard this portion of the comment.</p>	Included in summary above.
	<p>Also, copies of the publications cited in Chapter 7 "References" are not included in the DAEIS. Many of these can only be obtained in physical form from distant repositories, or from paid digital document services, or may not be publicly or conveniently available at all. This problem adds significantly to the time and resources needed for review and comment and, in many instances, precludes objective verification where information from these references may have been cited or incorporated into the DAEIS.</p>	Included in summary above.

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	<p>A related issue is that private research and possibly other documents have been submitted to the USCOE by the Applicants, some of which are in-house reports or letters, or unpublished studies conducted by private concerns which have been presented in legal arguments relating to the interpretation of provisions for the development of the DAEIS, or the process through which it was to be developed, although not cited in the DAEIS. There is no reasonable means, other than continuous Freedom of Information Act requests for "any new documents", through which 3PR could officially become aware of these reports, or gain insight into the degree to which they may have been considered in the review and/or development of the DAEIS.</p>	Included in summary above.
	<p>3PR therefore questions the adequacy of the DAEIS, and the accuracy of its information, in that it does not cite these documents, and therefore circumvents or diminishes the NEPA "public scrutiny" requirement. These include, but are probably not limited to, the following documents cited in a 25-Apr-2010 "hand-delivered" letter from Deedra Allen (Mosaic):</p> <p>Potential Future Mining Areas in the Central Florida Phosphate District, Environmental Consulting, Technologies, Inc.</p> <p>Water Quantity Issues Associated with Phosphate Mining, Dr. John E. Garlinger, Ardaman Associates, Inc.</p> <p>Stream Condition Assessments and Stream Reclamation in the Central Florida Phosphate Mining District, Environmental Consulting & Technology, Inc.</p> <p>Characterization of Forested Seepage Swamps on Mosaic Lands in the Bone Valley of West- Central Florida, Dr. Shirley Denton, Cardno ENTRIX.</p> <p>Why we need to mine Phosphate Rock in the United States, Ken Nyiri, CRU.</p> <p>Surface Water Quality Associated with Central Florida Phosphate Mining, Dr. Douglas Durbin, Cardno ENTRIX.</p> <p>Comments and Corrections of the Peace River Cumulative Impact Study, Joshua W. House, Mosaic Fertilizer LLC.</p>	Included in summary above.
	<p>When 3PR asked for a copy of one the documents from its author, the request was politely refused by stating "I'll have to get permission from our (phosphate mine) client".</p>	Included in summary above.
	<p>Also, no download date or metadata is provided. 3PR should be entitled to all digital and other information which was used as basis for the DAEIS so that it may verify the representations which the Applicants have made.</p>	Included in summary above.

	In addition to the excessive length and complexity of the DAEIS, the document states that information has been taken from a number of other voluminous publications, either by incorporating them by reference, or by vaguely alluding to them, as in Chapter 1.7, "These documents have helped to inform the USACE as it developed this AEIS on phosphate mining in the CFPD". Precisely 9 major documents were referred to in Sections 1.7.1 thru 1.7.9. There is no mention of precisely what information, or conclusions were adapted from these documents. Although the USCOE may incorporate by reference, the inclusion of entire encyclopedic documents without references to the specific information or sections used, is both unreasonable and untenable.	Section 1.7 of the Draft AEIS provides the names and brief summaries of nine prior environmental documents related to the AEIS in general or to specific subjects such as the Peace River. This information was provided for informational purposes only. The Draft AEIS does not state that these prior documents are incorporated by reference in general. If specifically referenced in the Draft AEIS, those references have a specific citation to the applicable document.
	Further, the four phosphate strip mine permit applications simultaneously noticed for review and comment, are referred to repeatedly throughout the DAEIS (e.g. ES.5.2). To 3PR's knowledge, these documents were not previously and formally made available to the public, or either their availability was not widely advertised or known.	Copies of all four applications were made available on the AEIS website in July 2012. Copies were available by request from the Corps prior to their being available on the website.
	3PR further questions the reasonableness and fairness of the abbreviated DAEIS review and comment timeframe, because of the importance of the resources at risks. The CFPD includes a large portion of the diverse physical and hydrologic features, and extensive environmental and biotic assets of west-central Florida. As a single example, the CFPD includes vast areas in the headwaters of 7 major watersheds, and 269 drainage basins (Figure 1). Of the 269 basins, 195 are entirely included, approximately 30 are about "90%" included, and only about 44 are less than 90% included.	Comment acknowledged.
	Although not all of this region has been mined, or is planned to be mined, it is reasonable to assume that it will be mined at some time in the future.	As discussed in the Draft AEIS, there are a number of reasons why it is not reasonable to assume that all of the unmined land in the CFPD would be mined. The Final AEIS has been updated to include consideration of phosphate prospecting data as an additional factor.
	The four proposed phosphate strip mining permits will impart extremely large impacts within the CFPD.	Comment acknowledged.
	3PR asserts that the DAEIS is inadequate and inaccurate in accomplishing the legal NEPA purpose, because numerous highly significant environmental issues relating to the negative environmental impacts of phosphate strip mining, are either entirely omitted, or not adequately or accurately addressed in the DAEIS. Nowhere are these important concerns sufficiently considered, either individually, collectively, or cumulatively in full consideration of known negative impacts of historic and current phosphate strip mining. A considerable body of scientific literature exists which is omitted and ignored through the DAEIS. These highly significant and relevant issues include, but are not limited to (in no particular order of ranking):	Where appropriate, each of the listed concerns were correctly characterized and addressed in the Final AEIS. The exceptions are the concerns about mining safety and the use of fertilizers containing phosphate leading to water pollution, both of which are beyond the scope of the AEIS.

	<ul style="list-style-type: none"> • Increased radiation exposure as short-term and long-term public health risks, and threats to plant and animal life. • Region-wide destruction of native ecosystems and vegetative communities through direct destruction or disturbance of their specific native soils and geology [of particular concern is the dependence of the native vegetative communities of the Southwestern Florida Flatwoods Ecoregion on highly specialized soils and geology]. • Large-scale destruction of critical habitat for endangered and threatened plants and animals, including those federally listed, and those listed by local, state, and regional agencies. • Extensive regional habitat fragmentation involving tremendously broad gaps between intact ecosystems. • Vast infestations of cogongrass and other invasive, noxious, or weedy plants which dominate the disturbed, non-native, unnatural substrate left after mining. • Large-scale, permanent loss of genetic diversity through direct destruction of large tracts of native ecosystems, and their cumulative impacts. • Complete eventual destruction of 195 entire natural drainage basins in the CFPD. • Area-wide deforestation and its regional and state-wide impacts. 	part of comment above
	<ul style="list-style-type: none"> • Lack of consideration for newly iscovered/described taxa. • Creation of extensive above-ground clay waste disposal facilities (misnomered as "clay settling areas", CSAs, by the phosphate industry"), including their existence as permanent barriers to terrestrial wildlife, and their perpetual management requirements, and other economic and environmental liabilities. • Injuries and deaths associated with mining-related activities, or ancillary to the industry. • Extensive loss of economically viable agricultural lands, and destruction of Hardee County's rural and agricultural heritage. • Large-scale impairment and physical obstacles to west-central Florida transportation and future urban planning. • Extensive secondary pollution via wide-scale contamination of surface waters and aquifers with phosphate chemical fertilizers, such as the well-documented contamination of groundwater along the Lake Wales Ridge which, in concert with other chemical contaminants, continues to be a growing economic and environmental liability. • Degradation of regional aesthetics. • Large-scale reduction of essential wilderness lands needed for non-game wildlife and ecologically-related recreational activities. 	part of comment above

	<ul style="list-style-type: none"> • The inappropriateness of allowing large-scale mitigation in exchange for the destruction of natural ecosystems. • The inappropriateness of offsite mitigation in exchange for the destruction of natural on-site ecosystems, which represents a 100% net loss of habitat at the project sites. • Loss of living space, water resources, and agricultural products which could provide for the support of hundreds of thousands of people, and probably more, as a result of future population growth. • Loss of future jobs and tax bases due to loss of living space and water resource degradation. • Historic loss of the potential for jobs, growth and development, and tax base due to phosphate land industry land ownership. • The phosphate industries long history of effluent spills, chemical spills and releases, both large-scale and small-scale, into wetlands, waterways, soils, groundwater, air, and into the general environment, both locally and into other regions. These include, but are not limited to, discharges which travel down the Peace River, Myakka River, and Horse Creek towards Charlotte, Lee, and Sarasota counties on the Gulf Coast of Florida (as an example, see pictorial of the 2002 Homeland Spill beginning with Photo 1). 	part of comment above
	<p>3PR questions the adequacy of the environmental analyses and the accuracy of the information in the DAEIS, because many references are not cited according to accepted standards or are entirely erroneous. The majority of reference (bibliographic) citations do not provide adequate source information. Also, see previous comments concerning referenced information and documents. A significant example relates to the following "reference" which appears to reference a document.</p> <p>DAEIS Page 7-11, lines 9-10: SWFWMD (Southwest Florida Water Management District). 2009. Florida Land Use Cover Classification System (FLUCCS).</p> <p>However, no such document exists. The most recent version of the universally used Florida Land Use Cover Classification System was published by FDOT in 1990. The DAEIS should have referenced that as the 1999 Land Use GIS data layer developed by SWFWMD contractors.</p>	Citation and references, including the one noted in the comment, have been updated and corrected in the Final AEIS.

	<p>Palmer, Margaret A., et al. 2005. Ecological science and sustainability for the 21st century. Front Ecol Environ 2005; 3(1): 4–11.</p> <p>* Summary: Ecological science has contributed greatly to our understanding of the natural world and the impact of humans on that world. Now, we need to refocus the discipline towards research that ensures a future in which natural systems and the humans they include coexist on a more sustainable planet. Acknowledging that managed ecosystems and intensive exploitation of resources define our future, ecologists must play a greatly expanded role in communicating their research and influencing policy and decisions that affect the environment. To accomplish this, they will have to forge partnerships at scales and in forms they have not traditionally used. These alliances must act within three visionary areas: enhancing the extent to which decisions are ecologically informed; advancing innovative ecological research directed at the sustainability of the planet; and stimulating cultural changes within the science itself, thereby building a forward-looking and international ecology. We recommend: (1) a research initiative to enhance research project development, facilitate large-scale experiments and data collection, and link science to solutions; (2) procedures that will improve interactions among researchers, managers, and decision makers; and (3) efforts to build public understanding of the links between ecosystem services and humans.</p>	<p>The Draft and Final AEISs were prepared by a third-party contractor selected in accordance with CEQ and Corps regulations and guidance. The Corps regularly participated in the preparation of the document, independently evaluated the information in the document to ensure that it was technically adequate and not biased, had the final determination whether the data provided is adequate and accurate.</p>
	<p>Substantive Comment: 3PR questions the adequacy of the environmental analyses and the accuracy of information in the DAEIS, because the document represents a failure in the scientific process. This research clearly establishes the need for better research initiatives, and improvement between the interactions of researchers and decision makers. For many sections of the DAEIS it is difficult to determine which information or position to evaluate and comment upon. Clarity is lacking, objectivity is lacking, scientific qualification is lacking, and there are many opposing statements.</p> <p>* Recommendation: The DAEIS should be rejected and completely rewritten, this time employing "independent" scientific authorities and credible research institutions to provide scientific information, analyses, and required research. "Objective" public involvement needs be much greater, and information and research need to be solicited from qualified sources. Many highly important cumulative analyses are needed in order to resolve the plethora of important, unresolved concerns relating to the extensive negative impacts of large-scale phosphate strip mining and its associated industries.</p>	<p>part of comment above</p>

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	<p>In order for "fair" review to take place, it is also essential that interested parties and potential reviewers be provided: (1) access to the four proposed phosphate strip mine properties so that the information and assertions of the Applicants may be verified; (2) all referenced and related documents, communications, and resources consulted or relied upon (in digital formats); that interactions between the USCOE and the Applicants take place only in a public forum, or that complete records of such communications be recorded and immediately made available for public viewing.</p>	<p>The Corps does not have the authority to allow public access to private property. All references and other information used to develop the Draft and Final AEISs, and all communications between the Corps and the applicants is available to the public, subject to FOIA requirements.</p>
	<p>3PR questions the accuracy of information and the adequacy of the environmental analyses in the DAEIS, because it does not include adequate assessments of these native systems, or include competent site- specific (on-site) evaluations and ecosystem analyses of these irreplaceable biosphere assets as is required by NEPA. West-central Florida, and in particular the xeric uplands and certain other vegetative communities and ecosystems which occur within the CFPD, are known to support unique floras and other ecologically specialized biota. Because the vegetative communities have not been adequately classified, and their ecological requirements are unknown, it is not possible consider their values and provide the proper protection required by NEPA.</p>	<p>The Final AEIS describes the biological resources associated with each alternative using the best available information. In the case of the four Applicants' Preferred Alternatives, this information includes the results of site surveys performed by environmental consultants during the preparation of the projects' applications and of site visits made by Corps staff.</p>
	<p>The scope of the AEIS is inappropriate.</p>	<p>Chapter 1 of the Final AEIS provides clarifications on the scope of the AEIS and USACE regulatory authority. Chapter 4 of the Final AEIS provides clarifications on the geographic and temporal scope used to evaluate alternatives' effects on the various resource categories. At its largest extent, the geographic scope does extend out beyond the limits of the CFPD, including downstream to Charlotte Harbor.</p>
	<p>3PR objects to the narrow and short-sighted view of the DAEIS, because its narratives nowhere express proper concern for the scale and intensity of mining impacts, the diversity of impacts, or especially the inestimable cumulative impacts and legacy of environmental disaster which phosphate strip mining has bequeathed west-central Florida.</p>	<p>Included in summary above.</p>
	<p>The DAEIS purports to include an "affected area" or "study area" designated as the Central Florida Phosphate District (CFPD)[which is actually the FDEP 'Conceptual Mineable Limit'] (Figure 1) which encompasses approximately 1.32 million acres of land (actually closer to 1.35 million acres), and which physically extends through parts of six counties. It is obvious that phosphate strip mining within the CFPD will not only profoundly affect the landscape of west-central Florida, but that the negative effects of mining will extend far outside of this artificial boundary, especially impacting "downstream" jurisdictions including Charlotte, Lee and Sarasota counties.</p>	<p>Included in summary above.</p>

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	<p>The boundary of the CFPD represents merely the mineable limit, that is, the extent to which the phosphate industry eventually will mine, or the currently economically feasible phosphate strip mining limit. However, an Environmental Impact Statement must include all regions and all types of potential "impact", including environmental impacts, economic impacts, and impacts to human society. For this reason, a much broader study area is needed. The study area should include the mineable limit plus a broad buffer extending downstream along the four affected major rivers (and Horse Creek) to, and including, the receiving bays and estuaries. Such a study area would then "truly" represent the "affected area" which will most certainly be negatively impacted by phosphate strip mining.</p>	<p>Included in summary above.</p>
	<p>The four phosphate strip mining approvals would, if permitted to do so, result in mining which would extend over decades, transcending politics, political terms, and changes in socioeconomic patterns. Post- mining scenarios will require the perpetual maintenance and management of inestimable liabilities such as CSAs, pollution spills, and various forms of other contamination. The negative economic of environmentally damaging industries "are generally hidden from traditional economic accounting" (Daily 1997). Eventually future generations which had no role in the permitting process, and which did not share in any of the short-term economic benefits, such as the very slight increases in jobs for local residents, will inherit the sad environmental and economic legacy left by phosphate strip mining. That is, the counties actually being sacrificed for mining will not share significantly in its huge profits.</p>	<p>Included in summary above.</p>
	<p>3PR considers that the DAEIS is substantially incomplete because it appears to center its attentions on Section 404 (CWA) Dredge and Fill permitting as though the vast and controversial phosphate strip mining proposals were merely small, necessary, business or residential projects with no significant environmental impacts, and as though wetland permitting were the only "real" issue. Nowhere does the DAEIS provide sufficient data, analysis, and direction commensurate and consistent with fulfilling NEPA's purpose of "Protection of the Environment" in preparing and administering "Environmental Impact Statements". Incredibly, Alternative-1 ("No-Action") does not appear to restrict or prohibit continued mining in uplands and upland ecosystems, which is where the most profound and irreparable impacts of phosphate strip mining take place. Such mining "strips" away the landscape, then "mines" the earth (matrix) below it. It appears that the DAEIS allows, even with "no permit", that the most significant and devastating of all aspects of phosphate strip mining will still be allowed to take place. The direct impacts include, but are not limited to: near total topographic alteration of the landscapes of entire regions, regional wide destruction of aquifers, vast and extensive alteration of recharge systems, area-wide reconfiguration of the surface-water runoff patterns of rivers, creeks, and seepage regimes, and area-wide changes to the average evapotranspiration rate.</p>	<p>Included in summary above.</p>

	As detailed in 3PR's other comments herein, the DAEIS is highly insufficient in scope: (1) in terms of evaluations of ecosystems and biota including the cumulative effects of ecosystem destruction, in terms of Environmental Justice, in terms of omission of data, analyses, documentation, and consideration of potentially important public and environmental health concerns relating to increased radiation, omission of analyses, documentation, and consideration of wide-spread negative impacts of noxious and weedy, or non-native vegetation.	Included in summary above.
	<p>The DAEIS states "The USACE's decision will be to either issue, issue with modifications, or deny Department of the Army permits for the proposed actions. The Draft AEIS (DAEIS) is intended to be sufficient in scope to address federal, state, and local requirements and environmental issues concerning the Proposed Action and permit reviews."</p> <p>3PR demonstrates throughout its comments that the DAEIS is inadequate and not sufficient in scope, in terms of its site-specific data and analyses, and in consideration of the fact that state and local requirements and environmental issues are omitted or all but ignored.</p>	Included in summary above.
	The Draft AEIS did not correctly consider phosphate mining's effects on surface and ground water hydrology and quality.	Chapter 4 and Appendices D, F, G, and J of the Final AEIS include information about the direct, indirect, and cumulative effects of phosphate mining on surface and ground water hydrology and quality. In response to comments received, analyses were updated and additional clarification was provided in the Final AEIS.
	The totality of upland transfiguration and ecosystem destruction will also have profound negative impacts to water quality and quantity. In fact, the DAEIS cites that phosphate strip mining in uplands will result in excavation of pits and pumping, potential reductions in water table elevations of "20 feet", and direct impacts to the surficial aquifer system (SAS), hydrology and sensitive habitats, groundwater dewatering, impacts to shallow wells, lowering of local water tables, and further extensive alterations to surface water management systems by ditching and construction of clay waste disposal (CSAs) sites including dams and berms.	Included in summary above.

	<p>NEPA requires coordination with state and local agencies and consistency with their laws, regulations, and planning. "The AEIS study area is located within a water supply planning area that SWFWMD has defined as the Southern Water Use Caution Area (SWUCA) on the basis of concerns that cumulative reliance on withdrawals from the upper FAS through well systems to meet potable, agricultural, and industrial water supply demands has resulted in an unsustainable lowering of the potentiometric surface of the Floridan aquifer." The DAEIS acknowledges SWUCA, discusses SWUCA, then fails to appropriately consider the tremendous magnitude of the negative water resource impacts potentially threatening the "Water Use Caution Area" by area-wide phosphate strip mining, most of which takes place in uplands, yet the impacts of which absolutely and profoundly affect river flows, aquifers, and wetlands.</p>	Included in summary above.
	<p>3PR questions the adequacy of the environmental analyses in the DAEIS, because it fails to address the tremendous negative hydrologic impacts from phosphate strip mining, past, present, and predictable for the future, even though a very considerable body of very broad-ranging, multi-disciplinary scientific research has determined these problems.</p>	Included in summary above.
	<p>The primary land-altering and re-contouring activities of phosphate strip mining comprehensively destroys watersheds and hydrology, greatly altering and compromising patterns of runoff, and regionally altering aquifer recharge, especially the inducing or increasing of recharge to the IAS and FAS. The vast historic areas of dry prairie (flatwoods / pine-palmetto flatwoods) are removed along with their native soils, many of which included spodic horizons which restrict recharge near the soil surface and maintaining the seasonally high ground water levels needed to support the ecosystem. These native soils, which are essential to the self-sustaining existence of native plants and wildlife are removed by the phosphate strip mining process and are replaced by unnatural Arents-Hydraquents-Neilhurst substrates. This results in profound impacts to local and regional hydrology by altering low-flow and patterns of low-flow, changes in recharge (inducing or reducing recharge, depending on various factors), increasing or reducing runoff (depending on various factors), and eliminating or substantially altering seepage regimes, and other hydrology.</p>	Included in summary above.

	<p>One of the hydrologically significant aspects of removing and/or disrupting vast regions of native soils and replacing them with materials which exhibit vastly different properties, constructing many large CSAs, re- contouring much of the landscape, and also creating many open bodies of water where virtually none existed before, is that evapotranspiration (ET) rates and coefficients are altered over large areas. Open bodies of water often have the highest ET rates.</p> <p>A reevaluation of ET rates is needed which better establishes the moisture lost from the many open water bodies and inundated areas created by the phosphate strip mining industry, whether temporary, or permanent. A cumulative analysis of ET especially needed so that water lost may be determined for all past, present and future phosphate strip mining.</p>	Included in summary above.
	<p>Throughout the DAEIS scientific data developed by the federal government, SWFWMD, and published in scientific journals is cited. Immediately afterwards erroneous or arbitrary statements are then presented by the Applicants (or from the industry perspective), presumably in refutation or rebuttal. However, either the statements made by the Applicants are unreferenced, or cite a letter or document from the phosphate industry, such as The Phosphate Council. The USCOE should not entertain conjecture and unqualified statements or information, or information from those with obvious or suspected conflicts of interests. For example:</p> <p>Page 3-63 states: "The case of Kissengen Springs is well documented. Kissengen Spring was a major spring which once contributed an average of 20 million gallons per day (mgd) of flow to the Peace River Basin in Polk County (Metz and Cimitile, 2010). USGS indicated that phosphate mining use of FAS wells for water supply was a contributing factor to the regional FAS drawdown that resulted in the cessation of flow from this spring (Metz and Lewelling, 2009)."</p> <p>Page 3-65 states: "Garlanger (2002) estimated that groundwater pumping supporting phosphate mining contributed less than 10 percent of the drawdown that occurred at a particular affected spring (Kissengen Springs) and that other man-made withdrawals contributed to the rest of the effect."</p>	Included in summary above.

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	<p>The fact that Kissengen Springs was destroyed by the phosphate strip mining industry is extremely well documented. At that time in history very few people lived at Bartow, and there were very few agricultural water users because irrigated agriculture was rare. Irrefutable evidence of this disaster remains to this day in the form of a legacy of utter environmental destruction along both banks of the Peace River from well above Bartow, through the defunct Kissengen Springs, south to Hardee County. USGS and SWFWMD publications indicate that the consumptive use of water from FAS greatly lowered the potentiometric surface and contributed to the formation of collapse sink holes along the Peace River which drain away much of the river's flow. Also, it was not only massive consumptive use which ruined Kissengen Springs, but the complete alteration of the surrounding surface water management system, SAS. It is also well documented that these impacts caused Kissengen Springs to fill in with clay.</p>	<p>Included in summary above.</p>
	<p>3PR questions the accuracy of the information and adequacy of the environmental analyses of the DAEIS, because significant issues relating to the SAS were not evaluated. All aquifers are impacted by phosphate strip mining, but the SAS is usually completely removed. Phosphate strip mining utterly disrupts natural geology and hydrology, removes native soils including their ecologically essential "unique" physical, chemical, and hydrologic properties, and replaces them with Arents-Hydraquents-Neilhurst substrates. These are unnatural wastes, overburden, or other unused substrates discarded as a result of phosphate strip mining and processing, and are documented to exhibit entirely different, and often environmentally extreme properties as compared to native soils (USDA. 1990; 2012a; 2012b). Other 3PR comments also address these issues.</p>	<p>Included in summary above.</p>
	<p>An integrated hydrologic model is needed in order to better determine the cumulative effects of phosphate strip mining on the flows of streams, runoff and surface flows, low-flow/base flows, and hydroperiods.</p>	<p>Included in summary above.</p>
	<p>The phosphate industry's track record of restoring the environment is dismal. In most phosphate strip mining operations the natural SAS is completely or mostly removed. The surficial aquifer system is the unconsolidated zone or strata, important in formation of seepage slopes and seep springs in Florida, generally of little or limited interest to most hydrologists due to small discharge or diffuse nature of seepage, but valuable to the residents of rural areas such as Hardee, DeSoto, and western Manatee counties, because they use the SAS as their primary source of drinking water, household water, and often irrigation water. There are many unanswered public health questions, both chemically and radiological, having to do with drinking and using water from shallow wells located on or near land formerly strip mined. There are also unanswered questions regarding the economic impact of mitigating these concerns, especially in low-income and minority communities which are present in these regions.</p>	<p>Included in summary above.</p>

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	<p>An independent scientific committee should be established to comprehensively and exhaustively evaluate the impacts which phosphate strip mining causes, and has caused, to native soils, natural aquifers, wetlands, and native ecosystems. Nowhere in the DAEIS are these impacts or natural resources properly evaluated, cumulatively evaluated, or their values genuinely considered as is required by NEPA in its single legally authorized mission and "Basic National Charter" of "Protection of the Environment". The protection of ecosystems is essential for the protection of all aspects of Florida's precious water resources, and for the protection public health and society.</p>	<p>Included in summary above.</p>
	<p>3PR questions the accuracy of the information and the adequacy of environmental analyses in the DAEIS, because there is insufficient discussion of wells on and near phosphate strip mines. A highly significant issue is that existing wells are not analyzed, discussed, or even identified in the DAEIS. Local residents near phosphate strip mining areas sometimes complain of "dry" wells.</p>	<p>Included in summary above.</p>
	<p>The DAEIS should very comprehensively analyze all aspects of the existing and potential negative impacts which wells and well water withdrawals have on local and regional water resources. Data and analyses are for the question of: (1) the effects of excessive consumptive use (2) the enhanced potential for aquifer contamination (particularly the surficial and intermediate aquifers) via well transport and induced recharge fro major geologic alterations; (3) the physical and hydrologic alteration of aquifers which impedes or alters their natural functions and negatively impacts dependent biotic systems; (4) the economic impacts associated with mitigating aquifer damage, and; (5) the contamination or other alteration of aquifers which contribute to public health concerns.</p>	<p>Included in summary above.</p>

	<p>3PR questions the validity of certain combinations of alternatives presented in the DAEIS, because some combinations of alternatives appear to allow 50 to 80 or more miles of stream alteration (difficult to precisely determine), which would be potentially devastating to the regional environment and water resources, including external impacts to the "downstream" jurisdictions of Charlotte, Lee and Sarasota counties. The vast majority of Florida's population lives near the coasts. Coastal areas rely to great extent on inland sources of water. As sea levels rapidly rise for the next 50 years due to global warming, brackish invasion and saltwater intrusion will increase, and coastal populations will simultaneously be retreating inland and increasing in density. The spring of 2012 reported record high temperatures. Winters are getting much warmer, and evapotranspiration rates are increasing concomitantly, disproportionately so because considerable herbaceous vegetation does not die back and continues transpiration as central Florida winters, on average, become warmer and warmer. The natural water resources of the CFPD are thus needed in order to support future increases in human occupation, and therefore must not be destroyed or degraded by phosphate strip mining.</p>	Included in summary above.
	<p>Mining requires the use of vast volumes of water. Mined lands greatly alter surface water management systems, and create many large open bodies of water which lose moisture much more quickly than native ecosystems and other pre-mine land covers. Such open water typically exhibits the highest evaporation rate of all land covers (Table 3), and especially large areas of water pigmented with fines. These and other hydrologic impacts of phosphate strip mining are hugely important concerns to human occupation in west- central Florida and southwest Florida. The concerns are not appropriately considered in the DAEIS.</p>	Included in summary above.
	<p>The DAEIS does not provide analysis of dry-season and wet-season meteorological/hydrologic cycles and influences which are all-important factors in modeling and predicting hydrologic systems, nor does it thoroughly evaluate La niña - El niña cycles, or factor in the projected effects and impacts of global warming on weather patterns, severity of storms including increased potential for floods and high winds, increased evapotranspiration rates, particularly in the winter, and other predicted impacts.</p>	Included in summary above.

	<p>3PR questions the adequacy of the environmental analyses in the DAEIS, because nowhere are the total water uses and water availability impacts of phosphate strip mining analyzed for the purposes ensuring that the need for new public water sources will not be created. Photos 4, 5, and 6 communicate a genuine level of concern where phosphate strip mining has the ability to interfere with runoff, recharge, storage, evapotranspiration, low flow, and climate. Of great concern is that the Applicants are proposing to use models and massive-scale engineering to control the flows of rivers, creeks, and tributaries. The implementation of these elaborate artificial systems will require continuous maintenance and, as a consequence, the natural ability of watersheds to deliver water to man and the environment will be greatly altered. Whereas, before mining, these systems were self-sustaining and auto-regulating, they were much more predictable and not subject to human error, miscalculation or abandonment. Most affected by these region-wide hydrologic, geologic, and ecological modifications, will be the "downstream" counties of Charlotte, Lee, and Sarasota counties. The water supplies of these downstream users will become "artificially" controlled by upstream interests.</p>	<p>Included in summary above.</p>
	<p>Not only is there a great environmental cost to disrupting the water resources of an entire region, but an ongoing and tremendous economic cost, much of which falls on the taxpayers, or those who inherit unforeseen or miscalculated problems. Intrinsically, based on the existing approved mine permits, the current four proposals, and future proposals, which will no doubt involve more extensive mining further south, these problems will be inherited by the same "downstream" jurisdictions. Any problems or interruptions in water supply or decreases in water quality will inherently affect these counties disproportionately because they support the greatest human populations. That is, Charlotte, Lee and Sarasota counties have the greatest need for water now, and will have an ever-increasing need for stable water supplies in the future. Further, man-made systems, especially those involving thousands of potentially large-scale risks, as in for spills and discharges, or interruptions of water flows, or excessive increases in flows, are much more subject to failure from natural and man-made disasters.</p>	<p>Included in summary above.</p>

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	<p>3PR questions the adequacy of the environmental analyses in the DAEIS, because many of the aforementioned significant issues and risks have not been properly assessed, and therefore have the potential to negatively affect water quantity and quality for a very large region of west-central Florida, as well as adjacent "downstream" counties, thereby endangering reliable sustainability of human society and the environment. Conspicuously absent from the DAEIS are data and analyses which demonstrate that the phosphate industry possesses the resources, ability, planning, and will to respond to natural, man-made, and accidental disasters, or engineering miscalculations. Also obvious is that many data and analyses avoid addressing "worst case" scenarios. The Alafia River spill, Peace River at Homeland spill, Archie Creek spill, White Springs spill, and many other incidents would indicate otherwise.</p>	<p>Included in summary above.</p>
	<p>Significantly more definitive and comprehensive analyses are needed in order to quantify the total water resource impacts of the proposed phosphate strip mines, including a full historical review of water use and water resource impacts already caused by mining within the CFPD. Because surface water, aquifers and ground water, and water quality are directly related, these entities should not be analyzed entirely separately, and as such cannot effectively be discussed separately. The needed area-wide studies should include a cumulative analysis of all historical water-related impacts. This is necessary in order to provide adequate understanding of the full environmental consequences of phosphate strip mining on water resources, both within the CFPD, and to external regions, including "downstream" coastal counties.</p>	<p>Included in summary above.</p>
	<p>Elements of the studies should include "independent" evaluations of water quality, quantity, and the distribution of water availability for human use and for the environment, including, but not limited to, analysis of: consumptive use, increased evapotranspiration rates, the effects of the removal of native soils and ecosystems, the effects of re-contouring and alteration of surface water management systems, spills and discharges, FAS impacts, IAS impacts, SAS impacts, wetland hydroperiod, flows and levels of rivers and streams, dams and impoundments including CSAs and the creation of new open water or inundated areas. These studies must be conducted with factoring for all aspects of global warming impacts, including atmospheric, hydrologic, ecologic and human cultural/social/economic. None of these issues are treated adequately in the DAEIS. The DAEIS does not provide adequate analyses to make important decisions regarding the water impacts imparted by tens-of- thousands of acres of new phosphate strip mining.</p>	<p>Part of above comment</p>

	<p>FIPR. 2001. Reclaimed phosphate clay settling area investigation: hydrologic model calibration and ultimate clay elevation prediction – final report. Florida Institute of Phosphate Research, No. 03-109-176. Bartow, Fla.</p> <p>* Summary: This research included monitoring hydrologic and meteorological conditions, mapping soils and vegetation, and developing topographic maps using photogrammetry. Field and laboratory data were used in models to estimate the effects of clay consolidation on post-reclamation topography and to calibrate hydrologic simulation programs. This report presents the research objectives, work plan, and study results of a research project designed to monitor and evaluate the hydrology and clay consolidation behavior of phosphate CSAs.</p> <p>The author's research published in 2001 reported that "There are more than 100,000 acres of clay settling areas (CSAs) in Florida. Presently operating phosphate mines in Florida have over 60,000 acres of above ground clay settling areas (CSAs), with an additional 20,000 acres designated for future CSAs." Also stated determined was that "The present guidelines used in CSA design relative to hydrology will probably prevent downstream flooding during large rain events. Though, these guidelines also result in post- reclamation conditions that fail to restore the low flow characteristics of the pre-mined land form".</p>	<p>Included in summary above.</p>
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	<p>Substantive Comment: 3PR questions the adequacy of the environmental analysis and the accuracy of the information in the DAEIS, because the findings of this research both differ directly from the assertions of the DAEIS in that indicate that the designs of CSAs fail to restore the low-flow characteristics of the pre-mined land, and also indicate difficulty in the predictability of some aspects of CSA hydrology. The incredible amounts of clays and unused mining materials which the phosphate strip mining industry disposes of in "CSAs" and over other post- mining areas, together with the fantastic tonnage of reagent chemicals returned with these wastes, and generalized elevated radiation as well, are ample reason to discontinue all phosphate strip mining in Florida.</p> <p>In addition, the report states that CSA design relative to hydrology will "probably" prevent downstream flooding "during large rain events". The term "probably" is not very reassuring, especially because it is merely used in the context of a large rain storm, and does not address the larger concern of tropical hurricanes. The additional highly distressing findings, which would be no surprise to any reasonable person even without study, is that the low-flows of native soils and geology cannot be engineered into one CSA, much less 180,000 acres of waste clay containments. That's approximately 34 sq miles. 3PR suspects even this figure is inaccurate, because it likely only involves designated CSAs, and not all other areas of clay deposited by the phosphate strip mining industry, and of course does not include the vast areas of "sand clay mix" which have also been dumped back into the environment and called "reclaimed" land.</p>	Included in summary above.
	<p>3PR questions the accuracy of the information and adequacy of the environmental analyses in the DAEIS, because it does not recognize the significance of the degree and extent of pollution generated by the phosphate strip mining, including, but not limited to, nonpoint pollution involving elevated phosphorous from runoff and spills, and from the use of chemical phosphate fertilizers for lawns, agriculture, golf courses, etc. Nonpoint pollution is considered to "the major source of water pollution in the U.S. today". (Carpenter 1998). Eutrophication is currently the most widespread water quality problem in the country. Restoration of eutrophic water requires reduction in the contaminants. The most important barriers to the control of nonpoint nutrient pollution are social, political, and institutional.</p>	Included in summary above.

	<p>Smith et al. 2006. Eutrophication of freshwater and marine ecosystems. Limnol. Oceanogr., 51(1, part 2), 2006, 351-355.</p> <p>* Summary: Nutrient enrichment of aquatic ecosystems typically results in significant alterations in biogeochemical cycling over both space and time. Concludes that it has been clearly established that two primary nutrients (P and N) can regulate aquatic primary productivity in most lakes and coastal marine ecosystems, although the actual response of primary producers to N and P enrichment can be modified by factors such as light limitation, hydrology, and grazing. The management of nutrient loading thus can be expected to remain a keystone to maintaining desirable quality in our surface waters. Echoes the conclusion of Schindler (2006) that despite these very significant advances, eutrophication remains one of the foremost problems in protecting freshwater and coastal marine ecosystems.</p> <p>Substantive Comment: 3PR questions the adequacy of the environmental analyses and accuracy of the information in the DAEIS, because the eutrophication of aquatic systems is a very serious issue and concern which has been correlated to increases in phosphorus (P) and nitrogen (N). Some of the substrates with which the phosphate strip mining industry replace the native soils and landscapes are high in phosphorous. This issue is a potential concern which relates to the on-site environment of phosphate lands after mining, but most significantly to offsite destinations via drainage, regular discharges, spills, and other transport mechanisms. Elevated phosphorous in the Peace River, as compared to historic values, has been a serious problem in the past. The downstream destinations of Charlotte, Lee, and Sarasota counties are of particular concern due to their large coastal populations and high property values.</p>	<p>Included in summary above.</p>
	<p>Eutrophication is a serious problem. The Draft AEIS did not adequately address the potential impacts of phosphate mining and fertilizer usage on water quality, including in areas downstream.</p>	<p>The comments about eutrophication are acknowledged. The direct, indirect, and cumulative effects of past, present, and reasonably foreseeably future actions, including the four proposed actions and their alternatives, on water quality are discussed in Chapter 4 and Appendix D of the Final AEIS. The effects of fertilizer usage on water quality are beyond the scope of the AEIS.</p>

	<p>3PR questions the accuracy of the information and adequacy of the environmental analyses in the DAEIS, because it does not recognize the significance of the degree and extent of pollution generated by the phosphate strip mining, including, but not limited to, nonpoint pollution involving elevated phosphorous from runoff and spills, and from the use of chemical phosphate fertilizers for lawns, agriculture, golf courses, etc.</p> <p>Nonpoint pollution is considered to "the major source of water pollution in the U.S. today". (Carpenter 1998). Eutrophication is currently the most widespread water quality problem in the country. Restoration of eutrophic water requires reduction in the contaminants. The most important barriers to the control of nonpoint nutrient pollution are social, political, and institutional.</p>	Included in summary above
	<p>Smith et al. 2006. Eutrophication of freshwater and marine ecosystems. Limnol. Oceanogr., 51(1, part 2), 2006, 351-355.</p> <p>* Summary: Nutrient enrichment of aquatic ecosystems typically results in significant alterations in biogeochemical cycling over both space and time. Concludes that it has been clearly established that two primary nutrients (P and N) can regulate aquatic primary productivity in most lakes and coastal marine ecosystems, although the actual response of primary producers to N and P enrichment can be modified by factors such as light limitation, hydrology, and grazing. The management of nutrient loading thus can be expected to remain a keystone to maintaining desirable quality in our surface waters. Echoes the conclusion of Schindler (2006) that despite these very significant advances, eutrophication remains one of the foremost problems in protecting freshwater and coastal marine ecosystems.</p> <p>Substantive Comment: 3PR questions the adequacy of the environmental analyses and accuracy of the information in the DAEIS, because the eutrophication of aquatic systems is a very serious issue and concern which has been correlated to increases in phosphorus (P) and nitrogen (N). Some of the substrates with which the phosphate strip mining industry replace the native soils and landscapes are high in phosphorous. This issue is a potential concern which relates to the on-site environment of phosphate lands after mining, but most significantly to offsite destinations via drainage, regular discharges, spills, and other transport mechanisms. Elevated phosphorous in the Peace River, as compared to historic values, has been a serious problem in the past. The downstream destinations of Charlotte, Lee, and Sarasota counties are of particular concern due to their large coastal populations and high property values.</p>	Included in summary above
	<p>The Draft AEIS does not adequately address the impacts of the reagents used in beneficiation on water quality.</p>	<p>Chapter 4 and Appendix D of the Final AEIS describe the potential surface water and groundwater water quality impacts associated with phosphate mining.</p>

	<p>3PR questions the adequacy of the environmental analyses and the accuracy of information because the highly significant issue concerning the use of "reagents" in phosphate strip mining product processing is not adequately investigated. Also, the available research is mostly "not" independent. It is reasonable that some or all of these reagents, because of their chemical properties, would impact water quality, affect the functions of the physical environment, and negatively impact ecosystems and biota. A study involving the "fate and consequences" (FIPR 2001b, quotes below) of such reagents reported that:</p> <p>"Florida phosphate operations produce roughly 20 million tons of concentrate each year. Therefore, all of the reagents listed above are used in millions of pounds annually. These reagents are generally considered harmless to the environment for three reasons: (1) many of the organic chemicals are biodegradable, (2) some portion of the reagents remain on the rock surface and ultimately end up in the solid fertilizer products, and (3) the acids and bases neutralize each other in the process of water recycling.</p> <p>"Major reagents associated with phosphate beneficiation include the following: fatty acid (used as a phosphate collector in the rougher flotation step), amine (as a sand collector in the cleaner flotation step), fuel oil (as an extender), sodium silicate (as a sand depressant), soda ash or ammonia (as a pH modifier), and sulfuric acid (for washing away the collector on the rougher concentrate). Typical plant consumption of the various reagents is shown below:"</p>	<p>Included in summary above</p>
	<p>Reagent Usage Lb/Ton Concentrate</p> <p>Fatty Acid 4 - 6</p> <p>Fuel Oil 4 - 10</p> <p>Amine 1.5 - 2</p> <p>Soda Ash 4 - 6</p> <p>Sulfuric Acid 6 - 8</p> <p>Sodium Silicate 1 - 1.5</p> <p>Fatty Acid 4 - 6</p> <p>Fuel Oil 4 - 10</p> <p>Amine 1.5 - 2</p> <p>Soda Ash 4 - 6</p> <p>Sulfuric Acid 6 - 8</p> <p>Sodium Silicate 1 - 1.5</p>	<p>Part of above comment</p>

	<p>In the case of Fuel Oil, this estimate appears incredibly conservative, because in a later paper, published 2008, it was stated that "The Florida phosphate industry consumes about 150 million tons a year of fuel oil in the forms of No.5 oil or kerosene" (FIPR 2008b). That's 150,000,000 "Tons" not "Pounds (Lbs)" ! Possibly this is an error of some sort, because the magnitude of the latter value seems inconceivable? Several FIPR papers focus on the need to reduce consumption of reagents in order to reduce concentrate production costs. However, the use of such reagents appears to be increasing.</p>	Part of above comment
	<p>Recommendation: The phosphate strip mining industry uses various reagents which are employed to separate "matrix" components and more efficiently refine and obtain "concentrated" products. What substances are currently being used? Where have they been used? When and in what amounts they are used? Where do they end up? These questions have not been fully answered, especially not in ecological terms. Overall, the full range of potential negative impacts from the large-scale use of reagents has not been satisfactorily established. It is not rational to consider that 150-million tons of fuel oil placed into the environment is "harmless" (FIPR 2001b).</p>	Part of above comment
	<p>Comprehensive "independent" studies are immediately needed in order to determine the direct and cumulative impacts of releasing vast quantities of "reagents" into the environment, and potentially into products as indicated in FIPR (2001b). It may be logical to assume that the "reagents" are not highly purified individual chemicals and are actually composed of multiple chemical substances. The main classes of "reagents" may, in fact, vary in their chemical composition, and vary in consistency from time to time? Possibly some or all of these reagents represent the wastes of other industries? In order to provide the proper assurances which NEPA guarantees, including "Protection of the Environment" and to ensure that federal EIS actions are not "unsatisfactory from the standpoint of public health or welfare or environmental quality", the important issue of reagent use should be much more comprehensively investigated, scientifically scrutinized, and reported upon.</p>	Part of above comment

	<p>FIPR. 2001b. Fate and consequences to the environment of reagents associated with rock phosphate processing. Florida Institute for Phosphate Research, No. 02-104-172. Bartow, Fla..</p> <p>* Summary: Examines some basic aspects of reagent migration, and presents other information about rock phosphate processing.</p> <p>* Substantive Comment: (See previously provided comment and discussion relating to reagents).</p> <p>FIPR. 2008b. An investigation of floating reagents, final report. Florida Institute for Phosphate Research, No. 02-158-227. Bartow, Fla.</p> <p>* Summary: Describes "floating" reagents and various processes. Provides various data and information on a number of reagents and their utility in phosphate refinement/recovery.</p> <p>* Substantive Comment: (See previously provided comment and discussion relating to reagents).</p>	Included in summary above
	<p>The Draft AEIS did not adequately address reclamation or mitigation, including consideration of the role of specific environmental conditions in shaping ecological communities, and the lack of success of reclamation and mitigation efforts.</p>	<p>Chapter 5 of the Final AEIS includes expanded discussion of reclamation, including the process of reclamation and the requirements for revegetation and success, which include consideration of target ecosystem types. Chapter 5 also includes similar information about federal mitigation requirements. Appendix I of the Final AEIS provides examples of federal mitigation conditions.</p>
	<p>Orzell, Steve L., and Bridges, Edwin L. 2006. Species Composition and Environmental Characteristics of Florida Dry Prairies from the Kissimmee River Region of South-Central Florida. Avon Park Air Force Range, Environmental Flight. Proc. Fla. Dry Prairie conf.</p> <p>* Summary: Species composition and environmental characteristics of prairies (dry prairie / palmetto / pineland) within the Kissimmee River region. Six community types were recognized and characterized: dry-mesic, mesic, wet-mesic spodic, wet-mesic, acidic wet, wet-mesic alfic and calcareous wet prairies. The latter two represent previously unrecognized community types in south-central Florida. Overall, 269 vascular plant taxa were recognized. Species richness was measured, and soils and soils horizons were identified and name using hydrologic modifiers, then measured, and characterized for each community type. Quantitative vegetation sampling and multivariate statistical analysis was conducted for vegetation classification and ordination. Community analysis involved Canonical Correspondence Analysis (CCA). Soils were analyzed using 38 variables, including 33 environmental/physical/chemical attributes.</p>	Included in summary above

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	<p>Substantive Comment: 3PR questions the adequacy of the environmental analyses in the DAEIS, because it fails to include this landmark central Florida research, examines the highly precise relationship between individual species and their specific soils and vegetative community type, in evaluation of the environmental impacts of phosphate strip mining, and in its decision-making for "Protection of the Environment", which is the NEPA purpose. Orzell and Bridges clearly established the existence of a high degree of soil and hydrologic specificity for native dry prairie plant species. Although the study was conducted east of the Lake Wales Ridge in the Osceola Plain and Okeechobee Plain, the ecosystems and environmental conditions which were examined in the study area are very similar to those in the southern half of the CFPD. The study is widely known and adopted by Florida plant ecologists and used by federal land managers in the conservation of important, often very large federal reserves and properties.</p>	<p>Part of comment above</p>
	<p>It is further insufficient because scientific research indicates a strong correlation to native plant species and highly specific natural soil types, which indicates that the destruction of these communities, and the ecosystems of which they are an integral part, will be permanent. Also see Cole et al 1994.</p>	<p>Included in summary above</p>
	<p>As for animals, it is true that the gopher tortoise inhabits a wide range of habits, and can sometimes utilize non-native, or partially native sites, but plants and animals are products of their environments, that is, products of, and specific to, their particular ecological communities or vegetation associations, and functional populations normally do not establish and endure for long periods. It is crucial that ecosystems be preserved in order to protect listed plant and animal species. (This is discussed further in other of 3PR's comments).</p>	<p>Included in summary above</p>
	<p>Essentially, "reclamation", much of which involves and is considered to be "mitigation", in best case scenario, results in systems which would require high levels of maintenance to maintain their facsimile appearance. As for other large areas, cogongrass, weeds, non-native species, and other undesirable biota or biological/ecological characteristics become serious problems.</p>	<p>Included in summary above</p>
	<p>It is well documented that most listed plant species, because they are usually also "endemic" plant species, have very precise environmental requirements, and are found only in specialized native vegetative communities or associations within certain ecosystems (Orzell & Bridges 2006) (Cole et al 1994) (Huck 1987). The habitats are often supported by highly specific soils, and located in unique geomorphologic regions. The reason most plant species are listed as "endangered" or "threatened" is because of their very high degree of environmental specificity and narrow geographic ranges, that is, because of their endemism.</p>	<p>Included in summary above</p>

	<p>The health and potential for long-term stability of the native environment is not measured based on mobile animal species, but on the diversity and stability of plant communities upon which they depend. Ecosystems are self-contained and self-maintaining. "Natural ecosystems are invariably richer in species and more stable than those artificially developed, due to their many interdependencies and interrelationships" (Rau & Wooten 1980). Such natural systems draw in life-supporting materials from great distances. However, in non-natural areas, which are artificial, the interdependencies are missing, and they are therefore not self-sustaining. Energy and materials are not recycled efficiently, and constant maintenance is required. Phosphate strip mining sites, including upland "reclamation" areas, represent more severe examples of being "artificial" because of extreme alterations to soils and geology.</p>	Included in summary above
	<p>In addition to creating landscape dominated by substrates which cannot support natural or diverse natural upland ecosystems, the removal or alteration of the SAS will also cause hydrologic changes, including above and below ground alterations in flows and levels, that negatively impact all types of wetlands, including herbaceous marshes, bay heads and swamps, hardwood swamps, cypress swamps, seeps, etc. Man-made "reclaimed" wetlands seldom provide the same hydrologic functions as natural wetlands, exhibit altered hydroperiods, do not support equivalent species richness, often require continuous maintenance due to noxious or nuisance vegetation, are "out of context" with natural ecosystems, and are therefore of little ecological value. Such artificial systems may also present unusual environmental and physical risks to birds and other biota (as discussed elsewhere).</p>	Included in summary above

	<p>3PR questions the adequacy of the environmental analyses in the DAEIS, because it does not consider the irreplaceable values of natural wetlands systems, or the essential role of native soils relative to ecosystem function and hydrology. Evaluations of the important dynamics of surface water, groundwater and soil interaction are completely omitted. And, the DAEIS does not appropriately recognize and consider: (1) the regional (CFPD) and statewide cumulative impacts of area-wide destruction of entire classes of native wetlands, such as isolated wetlands; (2) the fact that wetlands systems are complex and have often taken hundred of years to develop, and that the phosphate industry does not have the technology (presuming it could exist), the resources, or the will to properly construct and manage, in perpetuity (or until stable and self- sustaining) many hundreds of isolated wetlands, miles of creeks, streams and tributaries; and, (3) that the processes required for wetlands to establish, stabilize, and begin to efficiently remove nutrients requires time — a long time in the case of forested wetlands.</p>	Included in summary above
	<p>It is a widely known ecological principal, and an exceedingly common phenomenon, that disturbed areas, and newly inundated areas, promote the colonization and rapid reproduction of various wildlife due to the presences of artificially and temporarily expanded resources. These short-term increases include space, water, nutrients (some native uplands in central Florida are actually low-nutrient systems which are precisely adapted to very specific acidic soils), soil de-compaction and aeration, increased light, greatly reduced or entirely eliminated competition, and the concomitant explosion of insects, larva, sprouting seeds, and small and thalloid plants which provide additional plentiful food sources for larger species. Almost any flooded area will quickly acquire and produce large amounts of wildlife for a limited amount of time.</p>	Included in summary above

	<p>Because the phosphate industry and related uses are almost continuously destroying ecosystems and creating pits, dams, vast enclosures of inundated waste clays, other wet areas, and creating the disturbed and somewhat alien substrates of open mine land, including "reclaimed land", which are often laden with nutrients and greatly differ in chemical and physical properties as compared to the soils required to support native ecosystems, ecological imbalances are continuously and dynamically taking place. These extreme impacts temporarily provide abnormal levels of "freed" resources. Because animals are forced into these areas from other regions of ecosystems being destroyed, and because animals flying over and moving through will seek out any available sustenance, active and recent phosphate mining continuously sponsors numerous examples of the unnatural, and environmentally unhealthy "population boom" phenomenon. A sudden or temporary abundance of certain types of wildlife, more than in natural systems, is invariably an indication of an ecological imbalance from a natural disaster, atypical event, or artificially induced problem. Therefore, the short-term bird and wildlife studies such as those cited here by the Applicants are irrelevant, and completely out of context from studies of mature systems, whether native or non-native. Ecosystems out of balance represent a concern. They are not an indication of ecological health.</p>	Included in summary above
	<p>Many mined lands eventually become overgrown with weedy and noxious plant species (such as cogongrass) and do not succeed to vegetative communities which experience natural or naturally compatible ecological succession. Such infested regions represent ecological and agricultural deserts. It would be very enlightening for the USCOE authors of the DAEIS to take broad and unrestrained tour of recently reclaimed and formerly reclaimed or abandoned phosphate lands.</p>	Included in summary above

	<p>3PR questions the adequacy of the environmental analyses and the accuracy of the information in the DAEIS, because certain statements such as under 3.3.62 are not reasonable, irrelevant, and inappropriate. It is not reasonable or rational for the USCOE to compare "reclaimed" phosphate strip mines to the qualities of native Florida ecosystems. Improperly using excerpts from short-term, narrow studies to suggest that "reclaimed" phosphate strip mines are in any way comparable, or even partly mitigate for impacts to native ecosystems, is in no way defensible. Isolated artificial facades, demonstration projects which required great expense to create and/or maintain, and concentrations of wildlife which are temporarily (and unnaturally) attracted to water resources, where none existed before, are in no way indicative of a functioning or stable ecosystem, nor do they provide significant value. Such areas may actually represent hazards and risks to wildlife. Further, the area-wide destruction of native upland and wetland ecosystems by the phosphate strip mining industry results mainly in vast, seemingly endless regions of noxious weed infestations which also promote imbalances in animal life. 3PR objects to the out-of-context excerpts, and conjecture of paid industry consultants or contractors, which are all too often encountered in the DAEIS.</p>	Included in summary above
	<p>Plant and animal species are products of their respective natural environments and range of environments. Except for certain generalist species, most native (indigenous) plants and animals are utterly dependent on specific native ecosystems, or similar classes of native ecosystems. Some mammals and reptiles, and (naturally) many birds, are mobile, to varying degrees. Some generalists may utilize man-altered sites from time to time, especially when they are forced to do, or are abnormally attracted to do so, or when they happen through a vast region of destruction and have no other alternative. Some species may occasionally breed in non-native areas, even though this is not a natural behavior of their biology or ecology.</p> <p>"By altering the character of the environment, human beings bring about changes in the behavior patterns of within and between species so that most species are unsuccessful. However, the few that are successful reproduce quickly sometimes in explosive fashion" (Rau & Wooten 1980). The animals which remain are pioneer-type animals that tolerate changes in food types, shelter, and have only limited relationships with other organisms.</p>	Included in summary above
	<p>Because their natural native habitat is being destroyed on a massive scale in neighboring areas by phosphate strip mining, and by other types of development, many species will be forced to move into any available land, natural or unnatural, which is not actively being mined.</p>	Included in summary above

	<p>Several important issues and concerns exist in relation to mined/reclaimed land. The natural ecosystems which are completely destroyed by mining, along with their highly specific and essential soils and geology, are replaced by rocky/marl/sand/clay/etc substrates (Arents-Hydraquents-Neillhurst). Because no indigenous plant species are adapted to these soils, there are no native ecosystems which can support the establishment of self-sustaining populations of animals, except for certain generalists, pest species such as rodents, and temporary or guest species. This unnatural situation introduces primary succession. "Primary succession occurs in an area where life has not existed before, such as on bare rocks, tallus slopes (which are unconsolidated slopes, land slides, embankments, etc.), sand bars, and sand dunes" (Rau & Wooten 1980). Lands impacted by phosphate strip mining and reclamation represent such "bare" lands and are therefore in a mode of primary succession. "Secondary succession occurs on bare sites previously vegetated" (Rau & Wooten 1980), but this assumes that unnatural changes to soils and geology have not occurred, and that such areas can be recolonized from intact external floral and faunal sources. Therefore, few, if any, native plant species naturally colonize these mined and reclaimed upland areas. Normally, native "pioneer species" would first colonize such areas. However, and quite the contrary in the case of phosphate lands, many such unnatural areas are immediately colonized by noxious plant species, weedy species, foreign species, and other undesirable plants which play little, if any normal ecological role in native ecosystems, or in ecosystem services, and typically provide few "real" resources to native wildlife. Some species, such as cogongrass, completely preclude the reintroduction of native plants, and the establishment of vegetative communities, and also present serious ongoing management and eradication liabilities.</p>	Included in summary above
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	<p>The Environmental Impact Analysis Handbook (Rau & Wooten 1980), which is widely used by federal agencies as a guide for developing environmental impact statements (e.g., by the Bureau of Land Management), concludes that "Unfortunately, we are finding that some of our most complex environmental problems are the result of environmental and ecological backlash. As a general rule we find that artificial projects and technological additions lead to the simplification of natural systems. This reductionism results in losses in biological efficiency, diversity, balance, and self-sufficiency of the biological community, and concomitant increase in pest species of plants and animals as escapees and weeds (Rau & Wooten 1980). Much of phosphate strip mine reclamation fits this dismal characterization precisely, especially after a few years, or after a few years without maintenance, that is, "life support". "Managed" biological systems, including "reclaimed" lands, and systems infested with noxious or non-native species, represent the lowest level of biodiversity, genetic diversity, and ecosystem services. For all intents and purposes these areas are effectively extinct. (Naeem 1997)</p>	Included in summary above
	<p>The region within the CFPD provides the primary sources and flows of clean, life-giving water to the numerous bays, estuaries, and inlets, both large and small, along the west Florida coast. Comprehensively destroying the vast native wildlife ecosystems in this area, and disrupting native soils and geology, will adversely impact the fisheries, marine ecosystems, essential estuary systems, wildlife sanctuaries, property values, including waterfront properties, businesses, and other coastal and "downstream" physical and environmental assets, as well as the quality of life in the most densely populated regions of west-central Florida, which are located near the coast and along rivers and waterways, mainly in Lee, Charlotte and Sarasota counties.</p>	Included in summary above
	<p>Natural systems are composed of the interrelated and inseparable factors of physical/geologic, hydrologic, atmospheric/climatic, and biotic. Damage to one creates damage to the others. Phosphate strip mining has a long history of obliterating these life-giving assets and precluding their natural recovery.</p>	Included in summary above
	<p>Mined land, whether in the process of being mined, whether reclaimed or not, is an impediment to wildlife and ecosystem function through habitat fragmentation, the creation of physical barriers, altered hydrology, soil changes, and many other problems. Mined land fragments habitats and prohibits wildlife from moving within their home ranges and thus restricts them from the resources needed for their survival and reproduction. In addition, the disturbed, physically altered, often chemically different soils, promotes the spread of nuisance and/or exotic opportunistic plant species that, under these conditions, invade, exclude, and/or preclude native species and habitats on-site and, through dispersal mechanisms, jeopardize the integrity of adjacent native habitats, and well beyond.</p>	Included in summary above

	The Draft AEIS did not adequately identify existing conditions within the study area, including within the boundaries of the alternatives.	Existing conditions within the AEIS study area, including within the boundaries of the four proposed mines and the four offsite alternatives, were described in Chapter 3 of the Final AEIS. The best available information was used to prepare Chapter 3, including the site-specific information about the four proposed mines as found in the applications for those four projects. That site-specific information will be verified by staff from the USACE and other agencies during the review of the individual projects.
	3PR contends that the DAEIS is particularly insufficient and inaccurate because it does specifically include analyses of the dry prairie (flatwoods, pine/palmetto flatwoods) vegetative communities that will be lost to phosphate strip mining mainly in the southern half of the CFPD.	Included in summary above
	3PR questions the accuracy of the information and the adequacy of the environmental analyses in the DAEIS, because it does not properly characterize the invaluable, irreplaceable, and virtually (in scientific terms) "unknown" natural resources within the CFPD, including the project sites of the four proposed phosphate strip mines, including the various alternatives. If the remaining fractions of natural ecosystems and vegetative and wildlife communities are not protected through the final AEIS, a monumental ecological and environmental catastrophe will result for west-central Florida.	Included in summary above
	Recommendation: The USCOE should consult with Archbold Biological Station for the purposes of developing plans for conducting comprehensive ecosystem analyses in the regions containing the four proposed mine permits (including the various alternatives) and throughout the remaining natural areas of the CFPD. These base studies are essential for competent and objective review of phosphate strip mining applications, including the cumulative impacts which they would potentially contribute. The studies fully analyze and provide a classification system for regional vegetative communities within regional ecosystems by correlating native flora components to their essential ecological, edaphic, geologic, topographic, hydrologic, and climatic requirements. At a minimum, ecosystem classification base studies, necessary for further analyses, should be of similar design and include the same level of analysis as those conducted by the Natural Resources Flight of the US Air Force Range at Avon Park (Orzell & Bridges 2006). The cumulative effects of multiple stressors should also be analyzed for the extant ecosystem and biota of the CFPD.	Included in summary above

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	<p>In terms of ecosystems and biota it is necessary that the DAEIS provide "an evaluation of the key plant and animal species, to give an ecological perspective of important species present, and to evaluate the biota in a regional context. This observation comes from direct observation and study on the site" (Rau & Wooten 1980). As explained in this section of 3PR's comments, and as detailed in others, the DAEIS does not provide an adequate "evaluation of the key plant (species)" because it is not based on current site-specific data and direct observation of the study area (the CFPD, including all permit alternatives), it does not competently list and provide relevant discussions as to the conservation of specialized, rare, or protected flora. It does not discuss the important and relevant aspects of plant endemism, and does not consider the protection of biodiversity and genetic diversity. The DAEIS is therefore inadequate and incomplete in this regard.</p>	Included in summary above
	<p>An obvious deficiency in the DAEIS is a lack of knowledge and understanding concerning the environs (mainly the Flora of the southern half of the CFPD).</p>	Included in summary above
	<p>Conspicuously omitted or absent from the DAEIS are investigations and discussions of plant and animal endemism. Objectively verifiable, site-specific, comprehensive ecological surveys should have been prepared specifically for the DAEIS by third parties, or recognized regional experts.</p>	Included in summary above
	<p>Many important wildlife areas have been completely eliminated by phosphate strip mining and other land uses. No trace remains of entire biotic systems which once existed before phosphate mining. The DAEIS is inadequate and inaccurate in that, in the context of unique ecosystems and endemism, there is no discussion of, or consideration for, the unique geomorphology within the CFPD impact area, nor is there a discussion of the "biogeography" of the endemic and/or listed plant and animal species in these distinct, unique regions.</p>	Included in summary above
	<p>3PR questions the adequacy of the environmental analyses and the accuracy of the information provided in the DAEIS, because it does not adequately or accurately evaluate or consider the fact that phosphate strip mining has destroyed much of the central Polk Upland, and is currently destroying some of the last vestiges of the Lake Henry Ridge, a unique geomorphologic feature with only small fragments of it original native ecosystem remaining. Also not adequately addressed in the DAEIS, are the xeric uplands and xeric upland systems of western Hardee and eastern Manatee counties. These environs are essentially unknown in the scientific literature, are of great interest to science, and of great importance to environmental conservation.</p>	Included in summary above

	<p>Because open public access to most of the lands within the CFPD has not been available, many of its great tracts of native land in Manatee, Hardee, Desoto, and Sarasota counties have not been adequately explored zoologically and floristically! No comprehensive searches have been conducted for species which may be "unknown to science". Even so, private scientists have made major discoveries including the discovery of several new plant species as well as several species formerly believed to be extinct in the region. It is clear that the DAEIS does not address the astounding diversity and concentrations of wildlife which exists in this region. Although not reported, or not accurately reported by the phosphate industry, limited local government surveys and observations have revealed ecosystems supporting a remarkable abundance of animal life as well as diverse and pristine natural plant communities. In addition to endangered flora and fauna occurring in the native ecosystems, very large populations of deer, gopher tortoise, snakes, other reptiles, turkeys, and numerous birds and other animals are abundant. Some of the native vegetative communities found within the CFPD may represent the last of their kind in west-central Florida. That is, no site-specific, current, relevant studies were conducted by independent scientists and used as a basis for development of the DAEIS in fulfilling its NEPA mandate of "Protection of the Environment".</p>	Included in summary above
	<p>3PR questions the adequacy of the environmental analysis and the accuracy of information in the DAEIS, because it fails to consider the extremely important role of native ecosystems, especially native upland ecosystems as repositories of ecological diversity, in maintaining climate, in sequestering carbon, in providing for native wildlife, including plants and animals, providing aesthetics and a healthy human environment, and many other benefits essential to humans and the environment. Also ignored are the irreplaceable values of native soils in maintaining water quality, regulating hydrology, ameliorating the climate, and supporting regionally adapted vegetation associations and unique gene pools.</p>	Included in summary above
	<p>Acknowledgement or analysis of the relationship of the specialized vegetative communities which occur in the Southwestern Florida Flatwoods Ecoregion (Figure 4) and their high degree of correlation to regionally specific and unique soils is conspicuously absent throughout the DAEIS. Possibly it is inconvenient to discuss the destruction of ecological resources which can never be restored or replaced.</p>	Included in summary above

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	<p>The expansive and diverse landscape of the CFPD, and the included regions involved in the proposed permits or alternatives fall with the Southwestern Florida Flatwoods Ecoregion, and as such, are characterized by highly complex, regionally unique, combinations of topography and hydrology, and very extensive globally unique ecosystems and regional wildlife food webs. Because the southern half of this region supports extensive xeric upland areas that are distinctly separated from other major ridges and uplands systems (particularly in Manatee County), its vegetative communities have recently been found to include additional unique endangered species. Several species thought to have been extinct in the region have also been found, and additional unknown taxa are under scientific review. These discoveries indicate a highly unique floristic region; one that is being rapidly pushed towards extinction mainly by the phosphate strip mining industry.</p>	<p>Included in summary above</p>
	<p>3PR questions the accuracy of the information and adequacy of the analyses in the DAEIS, because values and attributes associated with unique physiography / geomorphology were not properly evaluated and considered. The important assets found in the biological, physical/geomorphologic, aesthetic, and geological uniqueness of the various physiographic regions found within the CFPD, and within the geographic extents of the four proposed phosphate strip mining projects (including the various alternatives), were all but ignored in the DAEIS. Especially lacking in the document was any thorough evaluation of impacts and measurable guidance for protecting the important resources and attributes which relate to physiography/geomorphology.</p>	<p>Included in summary above</p>
	<p>Most of the various physiographic / geomorphologic features of central Florida, including west-central Florida, are known as regions of high biotic endemism and ecosystem specialization. Because, in 3PR's opinion, the preparers of the DAEIS are not qualified to evaluate these specialized features, regions, and areas of potentially high endemism, and because there is no evidence of their personnel having sufficient experience or expertise in west-central Florida ecosystems and regionally-specialized areas of biological sciences, the document is intrinsically flawed, inadequate, and inaccurate, or simply unqualified in this context. Additionally, its statements and conclusions in regard to ecosystem resources are unqualified in that no appropriate, adequate site-specific ecosystem evaluations were conducted by qualified regional biological research institutions, or qualified regional experts, using modern biological and ecological techniques and resources. NEPA requires that environmental components be properly evaluated so that the best possible decisions may be made. The data and analyses which are needed for the protection of ecosystems, specialized vegetative associations and biota are highly site specific. Species lists and general descriptions do not provide the levels of ecological understanding necessary to evaluate important NEPA conservation decisions.</p>	<p>Included in summary above</p>

	<p>The Draft AEIS did not adequately consider ecosystem services.</p>	<p>The Final AEIS provides sufficient quantitative information to allow the USACE to make a reasoned choice amongst alternatives. Also, pursuant to the USACE Regulatory NEPA implementing regulations at 33 CFR Part 325 Appendix B; the USACE does not prepare cost-benefit analyses for projects requiring a USACE permit. Chapter 4 addresses the impacts associated with mining, and potential mitigation for those impacts. Chapter 5 has additional information about mitigation, including of impacts to waters of the U.S. and how functional analyses of impacts and mitigation will be performed.</p>
	<p>Meyerson, Laura A., et al. 2005. Aggregate measures of ecosystem services, can we take the pulse of nature. <i>Front Ecol Environ</i> 2005; 3(1): 56–59.</p> <p>* Summary: Stresses the imperativeness of "ecosystem services" as essential to human well-being and that such services provide life support for the human population. Concludes that "quantifying and monitoring the flows of ecosystem services is critical", and that "quantification of ecosystem services and communication of the information to decision makers and the public is critical to the responsible and sustainable management of natural resources."</p> <p>Substantive Comment: 3PR questions the adequacy of the environmental analyses in the DAEIS, because it fails to consider the "essential life support" value of the extensive natural ecosystems which large-scale phosphate strip mining destroys. It has not quantified, nor does it provide any direction for the adequate protection and monitoring of "ecosystem services" within the CFPD which are essential to both humans and the environment.</p>	<p>Included in summary above</p>
	<p>Kremen, C. 2005. Managing ecosystem services: what do we need to know about their ecology? <i>Ecology Letters</i> 8:468-479.</p> <p>* Summary: Human domination of the biosphere greatly alters ecosystems, yet ecological understanding of ecosystem services is limited. The author discusses methods to incorporate vital ecological information into the environmental policy and management process.</p> <p>* Substantive Comment: 3PR questions the adequacy of the environmental analyses of the DAEIS, because significant issues relating to the future of humanity were not discussed. The author stresses that proper understanding of ecosystem services is critical for our human future. There is no discussion of ecosystem services, nor are there any similar considerations of for protection of the environment found in the DAEIS.</p>	<p>Included in summary above</p>

	<p>Diaz, S., et al. 2006. Biodiversity loss threatens human well-being. PLoS Biology 4(8):e277.</p> <p>* Summary: This important research summarizes contemporary science involving ecosystem services, and provides a synthesis from the latest scientific literature of the role of biodiversity in ecosystem services and human well-being. The findings indicate that the most dramatic changes in ecosystem services likely come from altered compositions of ecological communities and from the loss of locally abundant species rather than from the loss of already rare species.</p> <p>* Substantive Comment: 3PR questions the adequacy of the DAEIS, because there is no discussion of ecosystem services, nor are there any similar considerations consisting of rational dialogs and analyses relating to the need for environmental/ecosystem.</p>	Included in summary above
	<p>Daily, Gretchen C. et al. 1997. Ecosystem Services: Benefits Supplied to Human Societies by Natural Ecosystems. Issues in Ecology. No. 2, Spring 1997.</p> <p>* Summary: Provides information and research results concerning "Ecosystem Services" and the essential need to protect ecosystems in order to human existence to continue.</p> <p>* Substantive Comment: 3PR objects and questions the adequacy of the environmental analysis and accuracy of the information in the DAEIS, because it does not consider the tremendous negative impacts which phosphate strip mining inflicts on biotic ecosystems and "ecosystem services". Because the purpose of NEPA is "Protection of the Environment", the protection of ecosystems, ecosystem services, and biodiversity must be the primary focus of the USCOE in evaluating the past, new, and cumulative environmental impacts of phosphate strip mining.</p>	Included in summary above

	<p>Recommendation: Many questions concerning the cumulative impacts of phosphate strip mining on ecosystem services must be answered before any further consideration of mining is entertained:</p> <ul style="list-style-type: none">• What is the relative impact of the various mining-related activities upon supply of ecosystem services.• To what extent have various ecosystem services already been impaired by mining, and how are impairment and risk of future impairment distributed as a result of mining.• To what extent are the different ecosystem services in the study area interrelated.• How does damaging one ecosystem service influence the functioning of others.• What proportion and spatial extent pattern of land (ecosystems and restorable areas) must remain undisturbed with the study area in order to sustain the delivery of essential ecosystem services.	Included in summary above
	The Draft AEIS did not adequately address the issue of the loss of biodiversity and genetic information caused by phosphate mining.	The potential impacts of the four proposed actions and their alternatives on wildlife and wildlife habitat are described in Chapter 4 of the Final AEIS. As stated there, it is expected that with success mitigation (including avoidance and minimization of impacts) and reclamation, there will be at most a moderate, non-significant impact on wetland and upland habitat, which should ultimately lead to similar levels of impact to biodiversity and genetic resources. Coordination with the USFWS will be performed as part of the USACE review of the four proposed actions.

FAEIS - Addendum Appendix A

	<p>Naeem, Shahid et al. 1999. Biodiversity of Ecosystem Functioning: Maintaining Natural Life Support Processes. Issues in Ecology. No. 4, Fall 1999.</p> <p>* Summary: On of the most conspicuous aspects of contemporary global change is the rapid decline of the diversity of the Earth's essential ecosystems.</p> <p>* Substantive Comment:</p> <p>3PR objects and questions the adequacy of the environmental analyses and adequacy of the information in the DAEIS, because it does not consider the ALL IMPORTANT subject of "biodiversity". the fact that humans need healthy ecosystems for their continued existence, and the phosphate strip mining may be the largest single contributor to the destruction of genetic diversity and the environment in central Florida. NEPA's charter of "Protection of the Environment" is all but ignored in the DAIES.</p>	Included in summary above
	<p>3PR questions the adequacy of environmental analyses and accuracy of information in the DAEIS, because it neglects to consider the negative impacts and effects of phosphate strip mining on bio-diversity and the essential and necessary protection of genetic diversity within west-central Florida, and beyond (as these impacts affect surrounding regions and the biosphere).</p>	Included in summary above
	<p>Also, because phosphate lands have been held in ownership for such long time periods, much (or the majority) of the surrounding ecosystems have already been eliminated by other types of development, such as, necessary agriculture, residential, and business/commercial uses. Therefore, as a result of phosphate strip mining, many of the last remaining locally adapted gene pools of important plant and animal populations, and even the genetics of entire metapopulations, will be greatly reduced, or possibly entirely lost. This represents a very serious, once in history, issue of regional concern, which has the potential to affect entire bioregions of west-central Florida, and even the biosphere. The dire consequences of this situation are that there will be no ecologically appropriate, regionally-adapted, adequately diverse, genetic sources which could be used for re-colonization or secondary succession, if such were even possible. "If the Earth has lost its savor, from where forth shall it be salted?" Even in this scenario, which is in no case attainable because phosphate strip mining eliminates or completely destroys the structures of most upland native soils and geology, especially the environmental unique, sensitive and complex flatwoods soils, the results are fatal to the continued existence of our very diverse and irreplaceable native flora and uniquely Florida ecosystems.</p>	Included in summary above

	<p>Even if the soils and geology of the natural ecosystems which phosphate mining destroys were preserved, local gene pools would have been destroyed by clearing away natural vegetative communities, thus creating severe regional genetic erosion, which causes essential adaptations (genes/genetics), which may have taken millennia to develop, to be permanently lost! Genetic erosion occurs because each individual organism has many unique genes which get lost when it dies without getting a chance to breed and reproduce. Genetic erosion is compounded and accelerated by habitat fragmentation. In Florida, even with considering the hundreds of thousands of acres of mined lands, the habitats of many plants and animals, including but not limited to listed species, live in smaller and smaller chunks of fragmented habitat, interspersed with human settlements and farmland, making it much more difficult to naturally interact with others of their kind for the purpose of reproduction, so many die off without getting a chance to reproduce at all, and thus are unable to pass on their unique, often regionally adapted genes to the living populations. Phosphate strip mining thus destroys genetic diversity and creates genetic erosion on a regional scale, possibly completely eliminating entire locally adapted plant genomes (landraces, locally adapted varieties, or ecotypes). It has been well established, that the only effective and self-sustaining species protection, which is actually gene pool protection, involves the protection and management of sufficiently large tracts of native ecosystems.</p>	<p>Included in summary above</p>
	<p>3PR vehemently objects to the accuracy of the information and adequacy of the environmental analyses in the DAEIS, because the USCOE has not considered the extremely important issue of "loss of biodiversity. Agency action(s) may therefore contribute greatly to the decline of biodiversity in the Southwest Florida Flatwoods Ecoregion, and contribute to losses globally. Biodiversity declines are not limited to increased rates of species extinction, but include losses of genetic and functional diversity across populations, communities, and ecosystems (Chart 1). "The wide-ranging decline in biodiversity results largely from habitat modifications and destruction, increased rates of invasions by deliberately or accidentally introducing non-native species (such as "cogongrass", and the many weeds and non-native species encourage by the effects of phosphate strip mining) or over-exploitation (like phosphate strip mining) and human-caused impacts. (Naeem 1999).</p>	<p>Included in summary above</p>

	<p>"At a global scale, even at the lowest estimated current extinction rate, about half of all species could be extinct within 100 years. Such an event would be similar in magnitude to the five mass extinction events in the 3.5 billion year history of life on earth." (Naeem 1999). In view of the chart below it must be considered that "genetic" extinctions occur when a significant portion of a local gene pool is lost/depleted, or when essential genetic traits necessary for reproduction and survival are lost or weakened. Phosphate strip mining has already mostly deleted the gene pools of many species, over wide regions, many of which were mostly locally developed and adapted. A cumulative analysis of genetic erosion caused by the industry is needed.</p>	Included in summary above
	<p>The DAEIS, as written will encourage an onslaught unbridled phosphate strip mining, which will result in permanent large-scale gene pool loss and genetic erosion through irreplaceable destruction of many plant and animal populations, and in the elimination of much of the few remaining large tracts of native ecosystem in the region. The secondary and tertiary impacts of this ecological disaster will extend into the surrounding counties and regions, and far beyond because, due to its vast scale and severity phosphate strip mining is one of the largest single offenders of the environment in Southeastern United States.</p>	Included in summary above
	<p>Additionally, research in molecular phylogenetics is regularly revealing new genetically distinct species, many of which are monophyletic. Areas of native ecosystems involving the four proposed phosphate strip mining proposals (including all alternatives), as well as potentially restorable lands which have reasonably intact native soils and geology, must be protected until genetic studies can be conducted in these regions. There is considerable potential that genetically unique taxa will be discovered in this region when such studies are conducted.</p>	Included in summary above
	<p>3PR vehemently objects to the accuracy of the information and adequacy of the environmental analyses in the DAEIS, because the USCOE has not considered the extremely important issue of "loss of biodiversity. Agency action(s) may therefore contribute greatly to the decline of biodiversity in the Southwest Florida Flatwoods Ecoregion, and contribute to losses globally. Biodiversity declines are not limited to increased rates of species extinction, but include losses of genetic and functional diversity across populations, communities, and ecosystems (Chart 1).</p>	Included in summary above
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	<p>The DAEIS, as written will encourage an onslaught unbridled phosphate strip mining, which will result in permanent large-scale gene pool loss and genetic erosion through irreplaceable destruction of many plant and animal populations, and in the elimination of much of the few remaining large tracts of native ecosystem in the region. The secondary and tertiary impacts of this ecological disaster will extend into the surrounding counties and regions, and far beyond because, due to its vast scale and severity phosphate strip mining is one of the largest single offenders of the environment in Southeastern United States.</p>	Included in summary above
	<p>The relocation of plants and animals as described in the Draft AEIS does not work.</p>	<p>As described in Chapter 5 of the Final AEIS, relocation of certain species is only one conservation practice currently implemented by the Applicants. The USACE will coordinate any proposals to relocate federally-listed species with the USFWS.</p>
	<p>Menges, E. S. 2008. Restoration demography and genetics of plants: When is a translocation successful? Australian Journal of Botany 56:187-196.</p> <p>* Summary: This review paper stresses the many complex ecological factors that govern a reintroduction and the many complex ecological relationships that must be re-established for a species reintroduction to be considered a success. Chief among them is the generation time of a species. For long-lived plants, it may take decades for the translocated plants to become reproductive.</p> <p>* Substantive Comment: Long-term monitoring of reintroductions is necessary to evaluate the success of a project, and funding for such monitoring should accommodate this long-term component of reintroduction projects.</p>	Included in summary above

	<p>CDFW. 1991. Mitigation-related transplantation, relocation and reintroduction project involving endangered and threatened, and rare plant species in California. California Department of Fish & Game, June 14, 1991.</p> <p>* Summary: This research investigated and evaluated the status of many listed and rare plant projects including the efficacy and overall success of transplantation, relocation, and reintroduction of California State-listed endangered, threatened, and rare species. The primary results indicated that only 15% of 53 attempts were deemed successful. And, only 8% of relocations for mitigation were successful.</p> <p>* Substantive Comment: 3PR questions the accuracy of information and the adequacy of the environmental analyses, because such are entirely lacking in the DAEIS ! 3PR therefore also questions the merits of the relocation alternative. In general, the vast majority of endemic/listed plant relocation attempts fail, for many reasons, either in the short or long-term. Many such plants cannot even tolerate minor environmental/ecological changes or disturbances. An action other than the no-action (deny permit) alternative will result in the destruction of vast amounts of irreplaceable endemic/listed plant habitat, because ecosystems are destroyed on a massive scale by phosphate strip mining, its related activities, and its short and long term environmental effects.</p> <p>* Recommendation: Preserve and manage large enough on-site tracts of listed plant habitat to protect the local ecosystems which are essential for the long-term survival of Florida's precious endemic flora. Seek direction from the primary and only preeminent restoration ecology center in central Florida, Archbold Biology Station.</p>	Included in summary above
	<p>Recommendation: Based on the current state of scientific literature, there is no evidence that many of the listed plant species which might occur within the CFPD can be successfully established, in the long term, on reclaimed lands. In any case, the DAEIS offers no data and analyses which would support the feasibility of such experiments. Many species cannot be relocated successfully even back into their own habitats, or into sites identical to the donor sites (Menges 2008).</p>	Included in summary above
	<p>3PR questions the merits and the validity of relocating plants and animals as a conservation or mitigation strategy and disagrees that mitigation or relocating is a reasonable alternative for native ecosystem protection, or that it provides any significant conservation benefits. This is a significant issue. Vast amounts of Florida's native ecosystem have been destroyed in exchange for various forms of mitigation which often fail.</p>	Included in summary above

	<p>3PR questions the adequacy of the environmental analyses regarding listed (endemic) plant species, as well as the merits of the relocation alternative, or mitigation alternative, because no studies are presented in the DAEIS indicating which, if any, relocated listed plant species have been successfully established as viable, self-sustaining (an important criteria) populations, which continue without human intervention and maintenance into the long term. Much has been published regarding the failures of such relocation ventures (CDFW 1991), especially failures involving mitigation projects. Many relocation projects involving listed or endemic plant species which yield living plants for some period of time, later fail for a variety of known and unknown reasons, even with considerable artificial cultivation "life support" efforts. This failure is due to complex ecological factors that govern such reintroduction attempts (Menges 2008). No published research supporting the viability or success of listed plant relocation is cited in the DAEIS. The concept of native plant relocation is flawed because, as previously stated, such rare native plants are very critically integrated with their native environments. That's why the term "critical habitat" is used in relation to their ecological needs.</p>	Included in summary above
	<p>It is important that the long-term status of these token introduction attempts be analyzed as part of any relocation or reintroduction attempts, and that a cumulative analysis be conducted to quantify the amount/numbers and diversity of important Florida native plants species which have been, and which will be eliminated as a result of past, present, and proposed future phosphate strip mining, and unmined, but potentially mineable area within the CFPD. Paramount in these studies is the need to evaluate genetic erosion, that is, gene pool destruction of locally adapted species and ecotypes.</p>	Included in summary above
	<p>The DAEIS states that "In recent years, listed plant species and slow-moving listed animal species, such as the state-listed gopher tortoise, that are identified during pre-clearing surveys have been relocated before land disturbance to suitable onsite preservation or reclamation areas, or to suitable offsite areas." The anonymous author(s) of this statement are assumed to be the Applicants. The DAEIS does not specify the percentages of the total populations of such species which were relocated, and no long-term success data are provided.</p>	Included in summary above
	<p>The Draft AEIS did not adequately consider cogongrass.</p>	<p>The Final AEIS discusses how exotic plant species issues are addressed in USACE-required wetland mitigation areas in Chapter 5 and Appendix I. Exotic plant species management in upland areas is outside of the USACE's regulatory authority, however it is addressed by the FDEP in its ERPs and reclamation plans.</p>

	<p>USDA. 2012. Federal Noxious Weed List. U.S. Department of Agriculture (USDA/APHIS), effective December 10, 2010, updated February 1, 2012.</p> <p>* Summary: Contains the current (as of Feb. 1, 2012) list of federally listed noxious plant species. The National Invasive Species Council was created by: "Executive Order 13112 On Feb 3, 1999, Executive Order 13112 was signed establishing the National Invasive Species Council. The Executive Order requires that a Council of Departments dealing with invasive species be created."</p> <p>* Substantive Comment: In addition to several other noxious species which colonize "reclaimed" land, this list contains "cogongrass" (<i>Imperata cylindrica</i>).</p>	Included in summary above
	<p>Additionally, the primary vegetative cover of a very large number of acres of "reclaimed" phosphate strip mines is dominated by the invasive species cogongrass (<i>Imperata cylindrica</i>), which forms irrevocable monocultures over these vast ruderal landscapes. More thorough comments regarding cogongrass are presented in a separate comment.</p>	Included in summary above
	<p>Because the native plants and animals of the precious, and now rare or uncommon native vegetation communities and ecosystems of Florida require specific, undisturbed native soils, and also require interaction with the hundreds of other species within their respective "communities", the effects of phosphate strip mining together with the attraction of cogongrass to mined, disturbed, and reclaimed lands, has been devastating to the natural environment.</p> <p>The purpose of NEPA is "Protection of the Environment". Further phosphate strip mining will provide even more disturbed, non-native substrates which, as with past mined lands, will be destined to be dominated by the exceedingly difficult or impossible to eradicate, noxious cogongrass weed.</p>	Included in summary above

	<p>There has been considerable research, throughout several states, and countries, relating to the negative impacts of cogongrass. A large amount of resources has been spent specifically studying the problem as it exists on mined and "reclaimed" phosphate lands.</p> <p>However, the DAEIS does not mention this immensely significant environmental problem which is directly relevant to phosphate strip mining. Inexplicably, the terms "cogongrass" and "Imperata cylindrica" do not appear in the document, even though this species may be the dominant, or sub-dominant biological upland feature associated with mined land. The DAEIS is therefore inadequate and inaccurate in that it did not consider the devastating effect of cogon grass on the environment, and the continuing massive problem it presents to the natural environment.</p> <p>The problem of extensive, nearly ubiquitous infestations of cogongrass which occur on "reclaimed" phosphate mined lands should be solved before additional phosphate mine permits are issued. The plant is an extremely serious invasive noxious weed. It is economically infeasible to eradicate the plant on a large scale, and management attempts can damage native vegetative communities.</p>	Included in summary above
	<p>Brewer, J. S. 2008. Declines in plant species richness and endemic plant species in longleaf pine savannas invaded by <i>Imperata cylindrica</i>. <i>Biol Invasions</i> 10:1257-1264.</p> <p>* Summary: Examines the invasiveness of cogongrass (<i>Imperata cylindrica</i>) into native longleaf pine flatwoods and its impacts on species composition. The research determined that the species excluded many herbaceous species, mainly by shading them out, or through aggressive colonization and expansion. Cogongrass patch expansion results in dramatic declines in species richness. Invasion of longleaf pine communities will likely cause significant losses of short habitat-specialists and reduce the distinctiveness of the native flora.</p>	Included in summary above
	<p>3PR questions the accuracy of information and adequacy of the environmental analyses in the DAEIS because the very substantially significant issue of the negative effects of cogongrass infestations on reclaimed phosphate strip mined land is not addressed, nor is the species mentioned in the report. This section states that "The National Invasive Species Council (NISC) was established by EO 13112 to ensure that federal programs and activities to prevent and control invasive species are coordinated, effective, and efficient."</p>	Included in summary above

	<p>The rapid and dense colonization of "reclaimed" mine land by the federally listed noxious weed known as "cogongrass" (<i>Imperata cylindrica</i>) (USDA 2010) represents an exceedingly serious and highly significant environmental issue. There are extensive and often contiguous infestations of this highly invasive, environmentally destructive and difficult to control weed dominating the herbaceous layers of many existing "reclaimed" and abandoned mine lands. The species succeeds vigorously in disturbed substrates such as those generated by the phosphate strip mining industry as a result of mining, "reclamation" activities, ancillary operations and activities, and site maintenance. This invasive plant thrives and succeeds in nutrient laden substrates, and substrates which will not support native ecosystems, such as the rocky ancient excavated materials distributed at the surface in the post-mine scenario.</p>	Included in summary above
	<p>3PR questions the adequacy of the environmental analyses and accuracy of the information in the DAEIS, because it fails even to mention cogongrass, and the economic and environmental consequences of such unbridled comprehensive infestations as occur on previously mined lands, including "reclaimed" lands. Mined and reclaimed phosphate lands arguably host the greatest aerial extent of cogongrass infestations in west central Florida. This is a serious and for all practical purposes an insolvable problem caused by large-scale mining disturbances and conversions of native soils to clays, silica, overburden, and other discarded mining wastes, that is, "reclamation" materials. This and other research indicates that cogongrass infestations are highly damaging to native ecosystems and effectively preclude or prevent the success of many types of restoration and reclamation. Also, the vast infestations of cogongrass in the phosphate district act as a seed source for the entire regions and, as a result of storms, no doubt infest many distant properties. Cogongrass has proven very difficult and expensive to control, and even much more difficult to eradicate.</p> <p>* Recommendation: Additional phosphate strip mining should not be permitted to proceed until the cogongrass disaster and its many serious environmental and economic concerns are resolved.</p>	Included in summary above

	<p>Cogongrass alters fire ecology because it usually grows very densely and burns hot (B. Nelson / SWFWMD, Land Management, pers. comm.). These attributes have the effect of preventing or excluding native herbaceous species due to shading, crowding, and radical modification of essential fire regimes. The species is virtually impossible to effectively eradicate on a large scale due to physical land constraints and high economic costs, and because of the fact that the species simply recolonizes immediately, often with even greater vigor and aggressiveness. Based on observed aerial extents (cover) it is logical that the mined and/or restored areas of the CFPD represent primary sources of cogongrass seed generation and dispersal for much of the region. "Cogongrass spikelets are wind dispersed and have the potential to travel great distances" (FIPR 1997). The species is also very difficult to eradicate on a small scale without irreparably damaging the fragile, specialized soils and unique herbaceous layers of natural ecosystems such as flatwoods, live oak hammocks, xeric uplands, including transitional areas.</p>	Included in summary above
	The Draft AEIS did not adequately consider fire management of upland ecosystems.	Fire management of upland ecosystems is outside the authority of the USACE.
	<p>Menges, E. S. 2007. Integrating demography and fire management: An example from Florida scrub. Australian Journal of Botany 55:261-272.</p> <p>* Summary: Author reviews the ecology of fire in the scrub and analyzes life history and demographic data (most species studied for 10-15 years) of 16 rare and endangered plants of the scrub, and discusses the varied life history patterns of these plants. Some species balance two opposite strategies of survival in a fire-dominated system, seeding and sprouting, and others are more dependent on only one strategy.</p>	Included in summary above

	<p>Substantive Comment: 3PR questions the adequacy of the environmental analyses in the DAEIS, because it does not acknowledge the necessity of proper upland ecosystem management through the use of prescribed fire. Fire is essential to the life histories of most plants in the Florida scrub, and as shown elsewhere in 3PR's comments, in the expansive dry prairie/flatwoods/pine-palmetto vegetative communities found throughout the southern half of the CFPD. "Pyrodiversity", the variation of fire regimes in time and space, is essential to the continued natural functioning of Florida's upland ecosystems. The role of fire in maintaining native upland ecosystems is nowhere discussed in the DAEIS. The only mention of fire or fire ecology is vaguely in regard to scrub jay mitigation. 3PR also questions the accuracy of the information in DAEIS, because it is stated that "The phosphate industry uses chemical, mechanical, fire, hydrologic, and manual techniques to control nuisance and exotic plant species in mitigation areas." Although this statement is not in the context of fire ecology, it should be pointed out that burning the vast infestations of cogongrass which occur on mined and "reclaimed" lands is not compatible with what few native plant species may remain there, and also may not be compatible with some wildlife species. Also, using fire in an attempt to improve the appearance of land, without any real hope of eradication (as is the case with cogongrass growing in post-mining substrates) creates smoke and other air pollution concerns.</p>	<p>Included in summary above</p>
	<p>Menges, E.S. and Gordon, D.R. 2010. Should mechanical treatments and herbicides be used as fire surrogates to manage Florida's uplands? A review. Florida Scientist 73:147-174.</p> <p>* Summary: Mechanical treatments and herbicide often accelerated vegetation structure changes, but ecological benefits were generally greatest when they were combined with fire. Soil disturbances, weedy species increases, and rapid hardwood resprouting were sometimes problems with mechanical treatments. Fire itself was crucial for maintenance of individual species and species diversity. When feasible, mechanical and herbicide treatments should be used as pretreatments for fire rather than as fire surrogates. Managers should segue to fire-only approaches as soon as possible.</p> <p>* Substantive Comment: (Used in support of other comments). One of many papers indicating that natural fire, or in this case prescribed fire, is the ecologically correct and natural method for the management of xeric upland habitats. The DAEIS is completely inadequate in sufficiently characterizing ecosystems and managing natural areas within the CFPD.</p>	<p>Included in summary above</p>

	The Draft AEIS does not adequately address the topic of impacts to soils.	Soils and surficial geology are considered in depth as significant issues in Chapter 4 of the Final AEIS. The use of soils in wetland mitigation is discussed in Chapter 5 of the Final AEIS.
	Although a great body of science exists which provides technologies which enable efficient, profitable, and safe farming in areas supported by native soils, much less is known concerning the unnatural rocky/marl/sand/clay/etc (Arents-Hydraquents-Neilhurst) substrates resulting from phosphate strip mining. Table 1 suggests that 7,241 acres of dam-enclosed waste clay facilities (CSAs) would result from a previously proposed mine at Ona as analyzed by Hazen & Sawyer (2003), and that the vast majority of native soils would be transformed to post-mine substrates.	Included in summary above
	3PR questions the accuracy of information and adequacy of the environmental analyses in the DAEIS, because it does not consider that phosphate strip mining utterly destroys sensitive native soils, especially dry prairie soils, and replaces them with non-native substrates to which native vegetation and thus ecosystems are not adapted. This is a highly significant environmental issue not addressed in the DAEIS. The most important, and by far the most predominant natural (native) soils found on unmined phosphate-company-owned lands in Hardee County belong to the "poorly drained" drainage class, "B/D" hydrologic group (USDA 2012b). Because of very recent changes in the engineering criteria for hydrologic groups, extensive areas of B/D soils have been re-designated or redefined, as A/D hydrologic group. Both B/D and many A/D soils in Hardee County include the following types: Basinger fine sand, Bradenton loamy fine sand, Farmton fine sand, Felda fine sand - frequently flooded, Felda fine sand, Immokalee fine sand, Myakka fine sand, Pomona fine sand, Wauchula fine sand mapped by the NRCS. The crucial importance of protecting the integrity of these unique native soils, which are essential to mesic and seasonally wet native upland ecosystems, is discussed further in several other 3PR comments.	Included in summary above
	Phosphate strip mining extensively alters the physical, chemical, and hydrologic properties of surficial aquifers and water tables. It is well documented that native upland ecosystems and vegetative communities are precisely adapted and require these special natural attributes (Orzell & Bridges 2006) (Cole et al 1994) (Huck 1987). Natural native ecosystems and their specific vegetative communities are therefore precluded from re- establishment after and as a result of the soil impacts caused by phosphate strip mining.	Included in summary above

	<p>Recommendation: The effects of converting vast areas of native soils to unnatural post-mining Arens-Hydraquents- Neilhurst substrates, which cannot support native upland ecosystems, including "dry prairie, pine/palmetto flatwoods" vegetative communities, are devastating to the natural environment. These essential ecological assets must be thoroughly analyzed and assessed, providing special attention to the cumulative negative impacts which area-wide phosphate strip mining has imparted, and will impart, to the regional ecology, native biota, genetic diversity (genetic erosion), natural hydrology, and critical bio-hydrologic regimes of the Southwestern Florida Flatwoods Ecoregion. The aerial extent of each native soil type must be correlated to the amount of each native vegetative community lost. Each native vegetative community must be fully characterized as in Orzell & Bridges (2006), because little is known of ecosystem structure in the regions west of the Lake Wales Ridge, and because numerous plant species have been recently discovered in that region which were formerly unknown to science, and which are planned to be proposed for federal listing. Evaluations must be conducted for each alternative, and for lands which have already been mined, so that negative environmental impacts may be evaluated separately, and then cumulatively.</p>	Included in summary above
	<p>It does not consider the specific soil and geologic requirements of natural upland ecosystems.</p>	Included in summary above
	<p>Arens are moderately well drained to excessively well drained discarded overburden from the strip mining process, which exhibit a consistently alkaline pH. Hydraquents, called "slickens", are up to 85% clay and exhibit a high (alkaline) pH, and Neilhurst, which is excessively drained and usually composed mostly of sand with other inclusions. These unnatural substrates are intrinsically physically and chemically variable, and can be randomly homogeneous or heterogeneous in formulation. All are incompatible with the soils, hydrology, and ecology of native ecosystems, vegetation associations, and other natural systems.</p>	Included in summary above

	<p>"Alteration or removal of natural vegetation has been the primary cause of habitat destruction, reduction in native plants and animals, and species extinctions. Any proposed project that will alter or remove the native vegetation must consider the impacts ... " (Rau & Wooten 1980). The following represent some, but not all, of the significant adverse impacts and important issues identified by Rau & Wooten in relation to land clearing, draining and filling, changing watercourses, construction of dams and reservoirs, roads, and industrial use:</p> <ul style="list-style-type: none"> • Habitat destruction - ADVERSE • Loss of shelter and food - ADVERSE • Loss of native plants and animals - ADVERSE • Reduced species diversity - ADVERSE • Enhances site for invasion of noxious and weed plants and animals - ADVERSE • Creates conditions suitable for rodent outbreaks - ADVERSE • Increased edge effect - ADVERSE • Loss of climax species (in the case of forested habitats) - ADVERSE • Changes in migratory patterns of birds and wildlife - ADVERSE • Interference with migratory routes or normal movement of animals (in the case of roads) - ADVERSE 	<p>Comment acknowledged</p>
	<p>3PR further questions the accuracy of information in the DAEIS, because the table of listed plants which purportedly are found in the CFPD is in gross error due to omissions. And, because NEPA directs that EIS process coordinate and be consistent with state and local agencies. The Florida Department of Agriculture (FDA) lists additional endangered species not listed by the U.S. Fish and Wildlife Service, and the State Comprehensive Plan of Florida requires that mining and mineral extraction protect natural resources.</p>	<p>Table 3-20 in Chapter 3 of the Final AEIS lists federally-listed species in the AEIS study area, including Manatee, Hardee, and Desoto Counties. The Florida Department of Agriculture and Consumer Services reviewed the Draft AEIS and did not provide comments on state-listed plant species. Compliance with state requirements, including about listed plant species and the state comprehensive plan, is beyond the scope of the AEIS.</p>

	<p>3PR questions the accuracy of the information and the adequacy of the environmental analyses in the DAEIS, because of obvious errors and omissions in describing wildlife, and because in-depth site-specific ecosystem and wildlife analyses should have been conducted by "independent", unbiased third parties. In 2003, the Hardee County Mining Department staff and a several other professional biologists (consultants) conducted field surveys in to order verify wildlife surveys provided by the Applicant. The Applicant's data was found to be highly inaccurate in each case, and for each site surveyed/verified. In areas where the Applicant had not reported listed wildlife, hundreds of gopher tortoise, several gopher frogs, and several listed or rare plant species were found. Additionally, a primary recipient site used by one phosphate strip mining company for the relocation of gopher tortoise was carefully surveyed by county staff, and no tortoise were found. The site consisted of "rocky" reclaimed land, was infested with weedy species, and was observed to completely unsuitable as habitat for tortoise (although apparently authorized as a recipient site). It appears that applicants for mining permits have misrepresented or mischaracterized ecosystem resource and biota, grossly understating the actual species richness and habitat quality.</p> <p>Recommendation: The significance of the above example is to illustrate the strong need for environmental data and analysis, including ecosystem evaluations and species surveys, which has not to been provided by applicants. Important environmental data and analyses must be objective and independently verifiable, that is, developed by qualified third party scientists.</p>	<p>The USACE will be responsible for verifying the information provided by the applicants in support of their applications. Wildlife and listed species information will be coordinated with the USFWS.</p>
	<p>Cole, S., T. Hingten, and K. Alvarez. 1994. Vegetative characteristics of contiguous dry prairie on two soil types in Hardee County. Resource Management Notes 7(3):15-16.</p> <p>* Summary: Species diversity and density were significantly different between soil types, with some species considered "indicators" for specific soil types. There were significant differences in characteristics of less dominant plants species across soil types in dry prairie. Fire regime is very important in maintaining and controlling vegetative characteristics.</p> <p>* Substantive Comment: (Same comments as under Orzell & Bridges 2006, Huck 1987, and as elsewhere in 3PR's comments).</p>	<p>Comment acknowledged</p>

	<p>Huck, Robin B. 1987. Plant Communities along an edaphic continuum in a central Florida watershed. Florida Sci. 50(2):88-110.</p> <p>* Summary: Vegetative gradient analysis in central Florida flatwoods region. Vegetation changed with topography, moisture regimes and soils. A correlation between soil types and vegetation was shown evident. The vegetative communities analyzed included palmetto prairie, savannah, palmetto zone, cypress slough, pine flatwoods, oak-palm woodland, maple swamp forest, ash swamp forest, maple-ash swamp forest, oak woodland, saw palmetto zone, cypress dome, palmetto prairie, and cypress pond.</p> <p>* Substantive Comment: This paper is in support of other comments explaining the correlation between native soils types, natural geology, natural hydrology and specific native vegetative communities and plant species, particular the substantive comment under the Orzell & Bridges (2006) reference.</p>	Comment acknowledged
	<p>Additionally, the analyses provided in the document insufficiently characterizes the cumulative impacts to these rapidly dwindling communities, which are all but extinct in some cases, and does not, with particularity and specificity, address their ecological sensitivity, as required in order to fulfill the stated purpose of NEPA which is "Protection of the Environment".</p>	The cumulative impacts to wetlands/surface waters and upland habitat are discussed in Chapter 4 of the Final AEIS.
	<p>White, W. A. 1970. The geomorphology of the Florida peninsula. Fla. Dept. Nat. Resour., Bur. Geol. Bull. 51:1-164.</p> <p>* Summary: General mapping of the physiographic features and regions of peninsula Florida. Universally used as a standard.</p> <p>* Substantive Comment: Indicated the physiographic complexity of west-central Florida. It has been extremely well established that endemism and ecological uniqueness is strongly related to geomorphologic complexity.</p>	Comment acknowledged
	<p>Additionally, the study did not fully investigate all aspects of the potential for increased residential and commercial development which include ranges of land uses infinitely less damaging than phosphate strip mining.</p>	The evaluation of direct and indirect effects in Chapter 4 of the Final AEIS includes a No-Action Alternative - No Mining Scenario, which may consider alternative future land uses. In general, however, NEPA does not require consideration of other, more speculative predictions of future land uses, in place of or after mining.

	<p>CFRPC (Central Florida Regional Planning Council). 2002. Land Use Suitability Index for Use in Hardee County. Adopted November 12, 2002, Hardee County Board of County Commissioners.</p> <p>* Summary: This site-specific study examines the Ona Mine, concludes that: "The results of this study indicate that future land use patterns, in particular the ability to support various types of commercial agriculture and urban development, may be substantially altered as a result of large-scale phosphate mining in Hardee County."</p> <p>* Substantive Comment: This study indicates that phosphate strip mining results in regional-wide degradation and reduction in the ability of land to support viable agriculture and certain other uses. The scientific findings and the fact that very few "reclaimed" phosphate strip mines have been used for residential or public retail uses, objectively refutes many of the statements of the DAEIS. The following two graphics are very informative in providing a visual representation of the negative impacts of phosphate strip mining on the suitability of land for future use and on the environment.</p>	<p>Chapter 4 of the Final AEIS considers the direct and indirect effects of the proposed actions and their alternatives on land use. Chapter 5 of the Final AEIS includes discussion of the FDEP reclamation requirements, including the requirement that reclaimed uplands be returned to beneficial use. Decisions on how potential changes in land use comply with local regulations are beyond the scope of the AEIS.</p>
	<p>HCOCC. 2010. Hardee County, Sustainable Hardee Visioning for the Future. Hardee County Board of County Commissioners, Wauchula, Florida.</p> <p>* Summary: "The Visioning is aimed at identifying community goals and a means to achieve those goals, both short and long-term. Hardee County is faced with difficult choices in the current economic times. Realizing that growth and development have the ability to either support or hamper the community' desired, county officials began to develop a Community Vision for the community that could properly guide future development and identify solutions to challenges. The Visioning process is intended to utilize a broad range of community comments, issues and opportunities in developing community recommended strategies. The Visioning process is also intended to develop a framework within which to proactively plan, develop milestones and identify potential community champions for the recommendations. With each successive meeting, the community refined the broader comments into more focused, action oriented recommendations that will be used to develop the overall final Vision. The strategies identified are not necessarily government directed and/or supported, and in numerous cases involve local community and civic organizations with specific interest or association with related programs. This method creates broad based community support and responsibility for the implementation of the strategy. The County identified five areas of review and analysis that were discussed through a series of "Focus Groups" and community meetings to prepare the Visioning Report and to provide guidance for future projects and decisions. These groups included: Economic Development, Land Use/ Recreation/ Open Space/ Environment, Quality of Life/Housing, Education/ Workforce, Infrastructure."</p>	<p>Decisions on how potential changes in land use comply with local regulations are beyond the scope of the AEIS.</p>

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	<p>Substantive Comment: 3PR questions the adequacy of the DAEIS because it does not contain references to Hardee Count's "Visioning" process, or an adequate analysis of how the DAEIS is consistent with the goals, objectives, and policies of the Hardee County Comprehensive Land Use Plan. NEPA requires coordination with state and local agencies in order to help avoid inconsistencies with local regulations and planning.</p> <p>* Recommendation: 3PR suggests that interested persons take aerial and surface tours of previously mined and reclaimed lands in northwestern Hardee County (and of the "four corners" and northwards), then tour areas of unmined lands. Such tours would no doubt help guide public opinion and Hardee County's visioning processes.</p>	<p>Part of above comment</p>
	<p>3PR questions the need for much of the pro forma information and bulk contained within the DAEIS, because, as previously established, it is not consistent with NEPA. Many sections, such as this one, do not further the understanding of the impacts of phosphate strip mining. Even so, improvements in phosphate strip mining technologies have merely increased the destructiveness of mining by more completely obliterating native ecosystems, and by producing vastly more waste clays and other environmentally unfriendly results, as the industry has become more "efficient" in extracting its products. Before "Technological Developments", the remaining, often parallel mine cuts, with overburden between, left some land which could be utilized for residential/commercial. Many homes have been built on such properties just south of Lakeland. However, the massive waste clay containment facilities now so prevalent in the core of the CFPD, which have resulted from so-called "Technological Developments" in phosphate processing, have precluded residential and commercial land uses over large areas of west-central Florida, and the many thousands of acres of new (planned) CSAs will continue to preclude valuable growth and economic development far into the future.</p>	<p>The evaluation of direct and indirect effects in Chapter 4 of the Final AEIS includes a No-Action Alternative - No Mining Scenario, which may consider alternative future land uses. In general, however, NEPA does not require consideration of other, more speculative predictions of future land uses, in place of or after mining.</p>
	<p>Recommendation: Comprehensive studies need to be conducted in order to determine the amount of residential and commercial development which has occurred on phosphate lands (including on CSA's) which have been mined during the last 20 years. The results of such studies will quickly reveal "true" economic and social potentials of properties in the post-mine post-reclamation scenario. Mine ownership precluded large areas of land from being developed during the recent economic boom. Likewise, future phosphate strip mining will continue to physically and environmentally obstruct residential and commercial growth in central Florida. See Hazen & Sawyer (2004).</p>	<p>Part of above comment</p>

	The Draft AEIS does not adequately address the issue of environmental justice	Chapter 1 describes the outreach efforts for scoping and for the Draft AEIS. Section 3.3.7 describes the approach used to identify populations at risk that warranted environmental justice consideration. Potential EJ populations were examined at a county and census block level. Section 4.7 describes how potential environmental justice concerns were addressed by the AEIS review. In general, the results of the environmental justice analysis, and other analyses, indicates that none of proposed actions or their alternatives have a disproportionately high and adverse human health or environmental effects on minority populations and low-income populations
	3PR questions the adequacy of the scoping process for the DAEIS in terms of "Environmental Justice", because low-income and minorities may not have been well represented and accorded fair treatment and meaningful involvement, and because the Applicants appear to have been overrepresented throughout the process, including interactions relating to the development of the DAEIS. As previously indicated, the latter may be permissible under the Act, but tremendously and untenably biases the DAEIS.	Included in summary above
	3PR questions the adequacy of the measures taken in the DAEIS to assure appropriate levels of public involvement and participation, especially fair treatment and meaningful involvement of low-income and minority (non-English speaking) segments of local communities, which are prevalent in many areas of the CFPD, especially in rural jurisdictions such as Hardee County, an impoverished area, and DeSoto County, the poorest county in Florida.. Such socially and economically disadvantaged residents represent special cases of concern. They are deserving of the additional efforts needed to effectively involve and educate them concerning AEIS process, and concerning the myriad of potential negative impacts phosphate strip mining will ultimately have on their lives, livelihoods, and futures. They are also entitled to other supplementary and ancillary considerations which are necessary in order achieve "Environmental Justice".	Included in summary above

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	<p>3PR questions the adequacy of the environmental analyses and accuracy of the information in the DAEIS, because the "Environmental Justice Review" is inappropriate and not without bias, and because the processes involved in the review were not open and transparent to low-income and minority communities. 3PR also contends that low-income and minority communities may not have been appropriately informed, in accordance to their special needs, and as to the potential negative impacts which continued phosphate strip mining may have on their communities.</p> <p>Definition of "Environmental Justice" (EPA's Office of Environmental Justice): "The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies."</p>	Included in summary above
	<p>It is stated in the DAEIS that "Consistent with EO 12898, this Draft AEIS incorporates by reference the studies conducted by the Applicants on socioeconomic conditions in the CFPD". Firstly 3PR cannot determine the meaning of "incorporate by reference" in this context because none document(s) of the "Applicants" was/were referenced in this section or elsewhere in the DAEIS (as far as 3PR can determine).</p>	Included in summary above
	<p>Clearly, it is not appropriate, or in the best interests of minority and low-income populations for phosphate strip mining Applicants to determine their special needs or purport to administer environmental justice. The previously cited statement shows a clear conflict of interests in that the Applicants were allowed to provide data and analyses, and draw conclusions which have the potential to profoundly and negatively affect public welfare in regard to "Protection of the Environment" which is the purpose of NEPA. Executive Order 12898 is a presidential order directing the federal government, and all federal agencies, to investigate the environmental impacts of federal action on the lives, communities, and economies of "minority populations and low-income populations". Also, there is no mention in the Executive Order of addressing these concerns at the census block level as the DAEIS suggests. Quite to the contrary, the Presidential Memorandum that accompanied the Executive Order speaks only about communities and specifically cautions that minority and low-income "communities" may be missed and that "distortion" may occur by using census data (USEPA 1997).</p>	Included in summary above

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	Executive Order 12898 requires federal actions to address environmental justice in minority populations and low-income populations. The DAEIS does not consider the mandates of Environmental Justice in its deliberation, analyses, conclusions, and recommendations.	Included in summary above
	Of the six counties intersecting the CFPD, and the three "downstream" counties which are also greatly affected (Charlotte, Lee and Sarasota counties), Hardee and Desoto are the most impoverished, and support the highest percentages of minorities. 2011 US Census Bureau estimates that 44.5% of the population of DeSoto County belongs to minority classes, and that the per capita income in (2010 dollars) is only \$15,989. 26.9% of persons (nearly double the national average of 13.9%) are below the poverty level ³ . 52.4% of the population of Hardee County is estimated to belong to a minority. The per capita income is a mere \$14,668, with about 26.1% of persons (nearly double the national average of 13.9%) existing below the poverty level ⁴ . These two counties are entitled to additional protection under the following federal action to address Environmental Justice in Minority Populations and Low-Income Populations. In addition, it has been demonstrated, and documented, that immigrant minorities often intentionally avoid being counted by the Census, or by government. It is therefore very likely that the "actual" minority and low-income statistics for Hardee and DeSoto counties may be even more dismal than officially reported.	Included in summary above
	In any case, it is certain that wide-spread destruction of native agriculture soils and potential farmlands, some of which have been in production for decades, and extensive alterations of topography and water resources, will negatively impact these rural communities whose residents traditionally derive their livelihoods from local agriculture, historically the dominant industry of the region. Hardee and DeSoto counties rely almost totally on natural resources, in the form of agriculture, as an economic base. Many decades are required to build the infrastructure necessary to sustain such agriculture as citrus farming, truck (vegetable) farming, berry farming, cattle ranching, and others. Area-wide phosphate strip mining is an exploitive, short-sighted industry, out for huge profits at the expense of lands, traditions, and communities. Mining erodes agricultural infrastructure and the rural way of life by temporarily moving part of the economy to an industry which merely passes through, destroying agricultural land as it goes, and leaving perpetual community liabilities in its wake. Some agricultural lands recently mined have been in continuous agricultural production for nearly 100 years. The traditional way of life and futures of Hardee and DeSoto counties are thus threatened by mining.	Included in summary above

	When communities become reliant on a polluting and environmentally destructive industry for jobs and tax revenues, local governments become reluctant to take actions which would avoid risks to health and the environment that cost the industry money. In this scenario, minority and low-income communities usually do not enjoy other benefits in proportion to the health risks and economic impacts they bear.	Included in summary above
	The impacts of this single project (Ona) has the potential to negatively affect local communities and the environment on a large scale, and especially to reduce job opportunities for members of low-income and minority communities which traditionally rely on viable agriculture for the livelihoods in this region of Florida, and which, unfortunately, generally have much lower educational attainment than whites and certain other segments of society.	Included in summary above
	Minorities and low-income residents are invested in their communities the same as other classes. No matter where they live in a jurisdiction (county) their lives will be negatively affected by phosphate strip mining.	Included in summary above
	To allow phosphate strip mining to move through a county, or in this case an entire region, leaving a wasteland in its wake, is not Environmental Justice. In the case of Hardee County, and as explained previously, such far-reaching and diverse impacts as associated with phosphate strip mining will disproportionately affect minorities and those of low-income.	Included in summary above
	The majority of residents living within the southern half of the CFPD, mostly Hardee and DeSoto counties, either do not have a computer with Internet service, or do not have adequate Internet performance to effectively acquire and manage the documents involved. Not that they would actually be in a position to evaluate them. Disproportionately, the residents of these impoverished, less educated, mainly agricultural- based, strikingly lower socioeconomic jurisdictions, are much less able to become aware or acquire notice of federal actions, to analyze and understand the consequences of such actions, or effectively respond or comment. In many cases these residents do not possess an adequate level of education to comprehend the significance of the proposed action. This neglect is compounded by the fact that little or no effort has been made to specifically ensure that these special classes have been made aware of the scope, level of impacts, and long- term implications and consequences of the proposed, extensive, phosphate strip mining. In addition large percentages of these populations are minority classes, mainly Hispanic. Significant portions of the populations of Hardee and DeSoto counties do not read or speak English, or only marginally understand, read, or speak English as a second language.	Included in summary above

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	<p>An exclusion of minorities, poorer classes of people, and less educated people has occurred through lack of consideration of their special circumstances in the development of the DAEIS, and in phosphate strip mining matters in general. This is evidenced by their lack of participation proportionate to their population shares in DeSoto and Hardee counties. The minority classes in particular are not represented, or are poorly represented in local politics and government. Many do not hold jobs with industries that will pay them to attend public meetings, such as the phosphate industry. Such matters represent class discrimination based on national origin, race/color, and education, and are important "Environmental Justice" concerns not considered in the development of the DAEIS, or in the large permit applications currently being considered for approval which are intrinsically the subject and current focus of this federal action.</p>	<p>Included in summary above</p>
	<p>Because the minority and low-income classes, particularly those of Hispanic origin, represent the fastest growing segment of the populations of Hardee and DeSoto counties. Hispanic people will soon become heir to these counties, both socially and politically. Sadly, they are also destined to inherit the extreme liabilities and other negative legacies of area-wide phosphate strip mining. These generally include, but are not limited to, extensive clay waste facilities, wholesale ecosystem and wildlife habitat destruction, degradation and alteration of wetlands, creeks, streams, and water resources, elevated radiation levels, and pollution and spills of various types from various sources. The DAEIS is inadequate and inaccurate in that it does not specifically provide planning considerations for this social change, or social phenomenon, in consideration of the community impacts and economic shifts associated with phosphate strip mining.</p> <p>As previously indicated, many extreme environmental impacts, and many crucial environmental issues are directly involved in large-scale phosphate strip mining and its related industries. Much has been reported and published concerning the negative effects of such mining on minorities and low-income residents, and on their impoverished communities.</p>	<p>Included in summary above</p>
	<p>Because an insufficient amount of time was allotted for review and comment, this too is inconsistent with ensuring "Environmental Justice". It is not merely a deficiency in providing for the special rights of the low-income residents, impoverished communities, and minorities, which are guaranteed through special consideration, but communication of important issues and concerns, which in such communities requires a significant special effort because such citizens have less education, financial means, time, and lack access to the technical resources needed to read, verify, and comment on such a voluminous and technically specialized document as the DAEIS.</p>	<p>Included in summary above</p>

	<p>The DAEIS is therefore inadequate and requires reconsideration of all environmental issues, and introduction and of additional/new environmental data, analyses, and issues relevant to the well-known negative impacts of phosphate strip mining on low-income poverty stricken and high-minority communities and jurisdictions. In addition, the DAEIS is inaccurate because environmental analyses did not consider the particular and unique needs of minority populations and low-income populations as required by executive order. Changes and revisions are required throughout the DAEIS in order to correct this legal and moral deficiency.</p>	Included in summary above
	<p>Recommendation: A comprehensive Environmental Justice analysis should be performed for Hardee and DeSoto counties. The development of data and analyses should include a broad effort to extensively involve and objectively educate the residents of these communities as to how their lives, jobs, properties, and other interests may be impacted by area-wide phosphate strip mining.</p>	Included in summary above
	<p>USCCR (U.S. Commission on Civil Rights). 2003. Not in My Backyard: Executive Order 12898 and Title VI as Tools for Achieving Environmental Justice. Washington, DC.</p> <p>* Summary: Details the problems of discrimination and government negligence where protecting the people of minority and low-income communities (populations), and explains the duties and requirements of federal agencies to comply with all laws and mandates (such Executive Order 12898) in protecting such disadvantages classes.</p> <p>* Substantive Comment: When protection of the environment is concerned, federal agencies are required to conduct studies to determine the needs of minority communities and low-income communities, and to provide consideration through NEPA in federal actions. There is no mention of this publication, or of the "Commission on Civil Rights" in the DAEIS. The scant discussion of "Environmental Justice" in Chapter 1.7 of the DAEIS is inappropriate, inaccurate, and completely inadequate to address the concerns of the disadvantaged classes of Hardee and DeSoto counties (as detailed in previous 3PR comments).</p>	Included in summary above

	<p>USEPA. 1997. Interim Final Guidance For Incorporating Environmental Justice Concerns In EPA's NEPA Compliance Analyses. USEPA.</p> <p>* Summary: EISs are required to be broad in scope, addressing the full range of potential effects of the proposed action on human health and the environment. Regulations established by both the Council on Environmental Quality (CEQ) and EPA require that socioeconomic impacts associated with significant physical environmental impacts be addressed in the EIS. This guidance highlights important ways in which EPA-prepared NEPA documentation may help to identify and address ENVIRONMENTAL JUSTICE concerns.</p> <p>* Substantive Comment: 3PR questions the validity of the DAEIS, because it is evident that the rights of citizens of the low- income and minority communities in DeSoto and Hardee counties have not been properly protected, and they have not been appropriately informed as to the impacts that area-wide phosphate strip mining will have on their lives and communities. Clearly indicates that Environmental Justice is to be administered at the "Community" level. Also, see 3PR's previous, primary Environmental Justice comments.</p>	Included in summary above
	<p>USEPA. 2010. EPA's Action Development Process, Interim Guidance on Considering Environmental Justice During the Development of an Action. USEPA.</p> <p>* Summary: Provides list of steps, definitions, and explanations for considering "Environmental Justice" during the development of an action. Explicitly integrates Environmental Justice considerations into the fabric of EPA's ADP from rule inception through all the stages leading to promulgation and implementation. Provides additional information and decision-making processes relating to Environmental Justice concerns during the development of an action.</p> <p>* Substantive Comment: 3PR questions the validity of the DAEIS, because it is evident that the rights of citizens of the low- income and minority communities in DeSoto and Hardee counties have not been properly protected, and they have not been appropriately informed as to the impacts of area-wide phosphate strip mining will have on their lives and communities. Clearly indicates that Environmental Justice is to be administered at the "Community" level. Also, see 3PR's previous, primary Environmental Justice comments.</p>	Included in summary above
	<p>3PR additionally questions the adequacy of the environmental analyses in the DAEIS, because independent, site-specific research (Hazen & Sawyer 2003) indicates that mining will be at the expense of viable agriculture, long-term economic growth, future development, and protection of the environment, water resources, and public health.</p>	The findings of the AEIS analysis are not directly comparable to the referenced study performed by Hazen & Sawyer (H&S), due to the differences in assumptions and what was being measured.

	The economic profits of mining can never compensate for ecosystem destruction, or repair the damage to soils, aquifers, and geology. Only a small fraction of the residents of Hardee and DeSoto are employed by mining, the vast majority of profits of which benefit external destinations and entities.	Chapter 4 describes the effects of phosphate mining on ecological resources, soils, groundwater, and surficial geology.
	Proportionate to the amount of land utilized and impacted, phosphate strip mining creates very few fulltime jobs for Hardee County residents. Many of such jobs are merely temporary, as mining moves southward through the county. Because phosphate strip mining eliminates farmland, an important and much discussed concern recently debated in the Hardee County "Sustainable Hardee, Visioning for the Future" process (HCBOCC 2010), the large low-income and minority populations of Hardee County may be very significantly impacted by loss of employment.	The economic effects of the No Action Alternative, the proposed Ona and South Pasture Extension Mines, and the Pioneer Tract Alternative on Hardee County are described in Chapter 4 of the Final AEIS.
	<p>FFWCC. 2003. The 2001 Economic Benefits of Watchable Wildlife Recreation in Florida. Florida Fish and Wildlife Conservation Commission. Southwick Associates, Fernandina Beach, Fla.</p> <p>* Summary:</p> <p>This report examines the contributions of watchable wildlife recreation to the Florida economy. Tables detail the positive economic impact and other revenues from three forms of retail sales and economic impact, earnings, employment, and tax revenues.</p> <p>* Substantive Comment: 3PR questions the accuracy of the information in the DAEIS, because it relies on questionable sources for its economic analysis, mostly ignores the highly specific Hazen and Sawyer economic analysis, and completely evades considering the self-sustaining self-renewing and very economically significant contributions of "Watchable" wildlife. Phosphate strip mining is a "here-then-gone" industry which provide only a few local, full-time jobs, is massively destructive to all aspects of the environment, and leaves a legacy which includes a myriad of completely untenable liabilities, such as many square miles of waste clay disposal enclosed by high dams, elevated radiation levels, toxic spills, noxious weed infestations, a vast ecological wasteland, and many other potential negative impacts and hazards to humans and wildlife alike. Managing natural, self-sustaining ecosystems to aid the economy in the near and long-term, is not only essential to human kind, but is infinitely more reasonable than the self-destructive course of action of permitting area-wide phosphate strip mining, potentially over 100,000 acres in Hardee County alone, and eventually, most of the county. Sources of jobs and revenues involving watchable wildlife, outdoor recreation, and eco-tourism are also much more compatible with the rural and agriculture traditions of Hardee County.</p>	The findings of the AEIS analysis are not directly comparable to the referenced study performed by Hazen & Sawyer (H&S), due to the differences in assumptions and what was being measured. The No Action Alternative in the AEIS analysis considers that existing activities on the four proposed actions' parcels and the four offsite alternatives would continue as they are now. Consideration of other activities on those parcels such as ecotourism is speculative. The Final AEIS was updated to better reflect the areas considered as potential mine alternatives, including the Ona Mine (22,320 acres), the South Pasture Extension Mine (7513 acres), the Pioneer Tract alternative (25,321 acres), and Alternative A-2 (8189 acres) in Hardee County.

	The CH2M-Hill economic analysis in the DAEIS and the BOCC Ona Mine economic study (Hazen & Sawyer 2003) prepared by the Hardee County Board of County Commissioners, indicate that only a small number of temporary jobs will be created as the phosphate industry mines its way through the southern counties (mainly Hardee, DeSoto, and Manatee). "On average, there will be about 73 more jobs in the county each year than would exist without mining on the Ona Property"	Comment acknowledged. The findings of the AEIS analysis are not directly comparable to the referenced study performed by Hazen & Sawyer (H&S), due to the differences in assumptions and what was being measured.
	Additionally, the Hazen & Sawyer study did not consider the positive economic impacts and social values provided by non-game wildlife, safe commercial outdoor recreation, and environmental/wilderness aesthetics which benefit Hardee County , and which if further developed, could very greatly benefit the county and quality of life in the county, in perpetuity, as self-sustaining assets (FFWCC 2003).	Comment acknowledged.
	Aesthetic value is also a highly important value associated with geomorphology. Ridges, valleys, plain, and unique regional feature are important to the identities of people, communities, and regions. The DAEIS ignores or omits consideration of the fact that phosphate strip mining complete transforms regional character and regional and community identity. With most people, there is tremendous pride and sentiment associated with the physical and environmental character of the areas they live in.	Chapter 4 discusses the potential direct and indirect effects of the four proposed actions and the four offsite alternatives on aesthetics.
	Of additional significance and concern with the abbreviated comment period allotted the DAEIS, is that the document contains a large number of very complex and technical alternatives, each of which would independently require substantial time and resources to evaluate. Even to verify and comment on a single significant issue, such as hydrologic impacts, may require months. The DAEIS is thus further inadequate and deficient in that it contains a highly excessive amount of technical information. This is discussed further later, but in essence, the DAEIS does not only treat the geographic area involved as a single area-wide project, but includes many renditions of multiple subprojects, which must each be analyzed separately.	In response to public comments received on the Draft AEIS, the screening process of offsite alternatives was updated as described in Chapter 2 and Appendix B of the Final AEIS. The potential effects of the four Offsite Alternatives that were identified by that screening process and the four Applicants' Preferred Alternatives are described in Chapter 4.
	3PR questions the adequacy of the environmental analyses in the DAEIS, because the presentation and discussion of alternatives is internally inconsistent and avoids certain considerations relating to cumulative impacts, and cumulative impact analysis. The analyses of the alternatives would be more logically conducted according to each class of alternative, as in: "No Action", proposed, foreseeable, and potential.	Comment acknowledged.

	<p>3PR primarily questions this section because, except for Alternative-1 ("No Action" / "no permit"), none of the alternatives significantly protect ecosystems, wetlands, water resources, soils, climate, geology, human environment, the rights of the majority of citizens, or the rights of future residents. The purpose of NEPA, which is "Protection of the Environment", the "Congressional Declaration of Purpose", which in part is to "encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere", and "Environmental Justice", which is necessary to protect those who are most certainly not able to well represent themselves, are nowhere adequately furthered in the DAEIS.</p>	<p>The alternatives considered were identified and considered as required by CEQ regulations and the USACE NEPA implementing regulations. The AEIS was prepared in compliance with the requirements of NEPA and other federal regulations, including for consideration of environmental justice.</p>
	<p>3PR questions Alternative-1 ("No Action" / "no permit") because, as discussed in a previous comment, this alternative potentially allows many of the most severe impacts of phosphate mining to continue with approval. This is inconsistent with the NEPA purpose of "Protection of the Environment".</p>	<p>The No Action Alternative - Upland Only scenario involves mining in uplands where there is no discharge of fill material into waters of the United States that would require authorization under Section 404 of the Clean Water Act. Such activity would be beyond the regulatory authority of the USACE, even if there were associated environmental impacts.</p>
	<p>Based on the current levels of data, analyses, and other information which, although not included or considered in the DAEIS, were readily and easily obtainable, should have been included as standard professional practice. Resources should have been obtained independently by soliciting them from regional experts and consulting the commonly available scientific literature, libraries, biological research institutions, and public agencies conducting research. It is clearly evident that for the remaining (unmined) portions of the CFPD, that the scientifically, economically, and morally supported alternative, essential for the protection of the human society, human health and well-being, and the irreplaceable biological, ecological, and hydrologic resources of west-central Florida, is Alternative-1 ("No Action" / "no permit"), that is "no additional phosphate mining" alternative. It is apparent to any scientists who have expert knowledge concerning the biological, ecological, and hydrologic (water resources) of the CFPD, that obtaining and analyzing more environmental information, which is actually specific to the unmined regions of the CFPD, will result in an even stronger evidence supporting Alternative-1 ("No Action", or "no additional phosphate mining") alternative.</p>	<p>Comment acknowledged.</p>
	<p>3PR questions the validity of all alternatives presented in the DAEIS because they very obviously were not developed objectively and openly in the public interest. The alternatives are not reasonable in terms of their total direct negative impacts on the environment and society, especially their potential impacts to low- income and minority communities.</p>	<p>The alternatives considered were identified and considered as required by CEQ regulations and the USACE NEPA implementing regulations.</p>

	The Draft AEIS does not adequately address cumulative impacts.	The cumulative impact analysis is explained in Chapter 4. The analysis considers all past, present, and reasonably foreseeable actions, including past (previous and ongoing activities, including the existing mines), present (the four current actions - Desoto, Ona, Wingate East, and South Pasture Extension), and reasonably foreseeable (Pine Level/Keys Tract and Pioneer) actions related to phosphate mining. The temporal scope of the cumulative impact analysis is from 1975 until 2060. Actions prior to 1975 are taken into account as part of the characterization of the current conditions, in accordance with CEQ guidance.
	3PR questions the accuracy of information and adequacy of environmental analyses contained throughout the DAEIS, and contends that it is deficient in describing and characterizing the "actual" current, historic, and projected negative effects of regional phosphate strip mining, both individually for the four proposed mines, and cumulatively for all mining, and the CFPD. 3PR asserts that the following mission statement and stated purpose of the AEIS is not accomplished through the current draft (DAEIS). "Based on the continued applications for expanded mining in the CFPD, the size of the project area, the CFPD characteristics, and the potential environmental impacts, both individually and cumulatively, of the proposed actions, the Corps will prepare an Areawide Environmental Impact Statement (AEIS) in compliance with the National Environmental Policy Act (NEPA) to render a final decision on the permit applications."	Included in summary above
	Many important issues and negative impacts resulting from individual and cumulative effects of large- scale phosphate strip mining are not identified or discussed in the DAEIS and essential "current" and "independent" data and analyses are omitted or not referenced. The DAEIS does not include or consider important basic issues relating to large-scale destruction of ecosystems, the irreparable area-wide impacts to native soils and geology, the destruction of irreplaceable flora and fauna, the elimination of gene pools, or the reduction of biodiversity. Neither have the resources at risk been adequately or competently characterized or quantified, but only generally or vaguely, mainly through data supplied by the Applicants, and from generic sources. 3PR therefore contends that the DAEIS is insufficient for the purposes of evaluating the discrete, direct, or cumulative and ongoing impacts of phosphate strip mining in west-central Florida, and in providing for the stated NEPA purpose of "Protection of the Environment". These significant issues and others are presented in more detail in the substantive comments in the following sections.	Included in summary above

	<p>3PR questions the adequacy of the environmental analyses and accuracy of the information in the DAEIS, because it does not evaluate the ALL-IMPORTANT "cumulative" impacts which the phosphate strip mining and certain associated industries have inflicted on west-central Florida. In general, the DAEIS effectively avoids and obfuscates meaningful discussions and analyses relating to cumulative impacts.</p>	Included in summary above
	<p>A comprehensive cumulative analysis of all significant potential impacts must be a primary requirement and prerequisite before issuing new phosphate strip mining permits. The DAEIS states "The temporal scope of the cumulative impact analysis is based on the overall operational periods of the four proposed actions, plus any overlap with the operational period of the two reasonably foreseeable actions." This concept does not include the historic impacts of phosphate strip mining, which have been extremely extensive, and therefore does not constitute a cumulative impact analysis. NEPA is explicit that cumulative impacts include "past", "present", and "future" actions regardless of their sources, scale, or scope</p>	Included in summary above
	<p>The DAEIS does not accurately identify or quantify, as required by NEPA, all of the direct and indirect impacts resulting from past and on-going actions (prior to 1978). No maps, illustrations, analyses, or narratives adequately or sincerely consider the incredibly massive environmental disaster of historic and ongoing phosphate strip mining. Comprehensive analyses are needed in order to accurately determine the existing status of significant aquatic/hydrologic/biologic resources, which in turn, are necessary to determine the "real" impacts of the proposed projects on significant resources within the CFPD and in the other "downstream" regions which will obviously be affected. Further, because surface and ground waters are very vulnerable to incremental impacts, and because their cumulative historical impacts are overwhelmingly significant, it is absolutely essential that the USCOE expand the temporal scope of the AEIS to also identify and analyze all direct and indirect past major actions needed to accurately describe the direct, indirect and cumulative impacts the four proposed phosphate strip mining projects on existing and projected human resources and needs. That is, comprehensively evaluate all of the known and potential environmental and social impacts of phosphate strip mining in west-central Florida, past, present, and future.</p>	Included in summary above

	<p>An essential element of cumulative analysis involves the phosphate strip mining industry's tremendous generation of waste clays. Because waste clay disposal areas (CSAs) permanently reduce recharge of the surficial aquifer and lateral base-flows to adjacent streams in the regions they occupy, the DAEIS should be revised to identify, map and calculate the total acreage of clay settling areas to be constructed. Further, the total of post mining pits/ponds/lakes, which also significantly reduces stream and river flows to the estuaries, need to be identified and their impacts quantified. To this, add the millions of gallons per day in stream flows lost to the many sinkholes created, in part, by the consumptive use and withdrawals associated with phosphate strip mining. Very comprehensive and intensive analyses of the historic hydrology of the relating to the phosphate mining district are needed.</p>	Included in summary above
	<p>The information and analyses provided in the DAEIS does not fully identify or quantify the many adverse, permanent impacts caused by 350,000 acres of past mining (which occurred before the State's Mandatory Reclamation Rule). This serious omission invalidates any conclusions assigned to cumulative impacts. Ironically, the DAEIS maintains that the analysis of cumulative impacts is one of the most important elements of an EIS, although the information in the document does not reflect this value.</p>	Included in summary above
	<p>Recommendation: Before any new phosphate strip mining applications are considered, it is scientifically essential and morally imperative that all mining, past, present, and proposed, be comprehensively evaluated in terms of its cumulative impacts to the environment and human society. The analyses should include evaluations extending as far back in time as records or evidence exists. See the 3PR "Significant Environmental Issues" section, and other comments relating to the essential need of fully evaluating the cumulative impacts of phosphate strip mining.</p>	Included in summary above
	<p>A comprehensive cumulative impact assessment must be based on high levels of data and analyses, developed from research conducted within the project area (CFPD) by independent, regionally-experienced, well-known, third-part scientists, plus a comprehensive and independent treatment of each important biological, wildlife, and ecosystem concern.</p>	Included in summary above

	<p>The DAEIS and cumulative impact assessment should specifically include, but not be limited to, comprehensive evaluations and analyses conducted by scientists independent of the phosphate strip mining industry, which are based on site-specific data of:</p> <ul style="list-style-type: none">• The cumulative and compound negative effects of permanently destroying tens-of- thousands of acres of native soils crucial for the production of traditional types of local crops and foods, which are indispensable for the continuance of economically viable and flexible traditional agriculture, and which are also essential for the existence of native regional ecosystems including native vegetation associations.• The increased vulnerability to contamination of the IAS and FAS potentially caused by removal of the overlying SAS, and removal of the vital, irreparable, inscrutably complex and ecologically delicate upper soil layers and horizons, including, but not limited to, the spodic horizons of many dry prairie (flatwoods, pine-palmetto flatwoods) soils.• The destruction of thousands of acres of native wildlife habitat.• Increased Radium-226 and other radiological contamination in birds and other biota.• Destruction of thousands of acres of diverse, complex natural wetlands and waterfowl habitat, and attempting to replace such with biologically and hydrologically inferior reclaimed (artificial) wetlands which are "out of ecological context", and therefore lack natural ecological connections and interaction with elements of upland/wetland ecosystems.• Regionally altering surface and groundwater flows.	Included in summary above
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	<ul style="list-style-type: none"> • Creating tens of thousands of acres of surface disturbance and altering soils, resulting in large-scale ruderal conditions that promote endless and permanent infestations of noxious weeds and/or undesirable species, or disproportionate concentrations thereof, such as cogongrass, which are very difficult and massively expensive to eradicate. • Greatly increased evaporation loss potentially relating to the extensive areas of open water associated with clay waste disposal and settling/storage areas (CSAs), dewatering processes, water management, and exposed surface waters in mine pits. • Potentially excessive use and degradation of groundwater during the mining process. • The effects of ore processing reagents contained in sand tailing and waste clays which are disposed of, or used in, reclamation. • Climatic change which may result from regional deforestation and re-contoured, hydrologically altered, essentially treeless landscapes of many reclaimed lands. • Potential health and environmental risks associated with increased radiation, dust from unconsolidated, de-vegetated ground, and other environmental contaminants associated with the intensive operations of heavy industry. • Long-term aesthetic degradation. 	Part of above comment
	The proposed permit durations are too long.	The USACE and USEPA have had discussions means to review possible changes in permit conditions, including permit duration. However, the development of new federal or state policies or regulations for phosphate mining is beyond the scope of the AEIS review or the reviews of the four individual projects.
	<p>3PR objects to the issuing of phosphate strip mine permits (such as 404 CWA and other permits and approvals), which are valid for periods greater than 5 years. (1) Phosphate strip mining and its related activities are very intensive industries which create large-scale and far-reaching impacts within short periods of time. Granting long-term approvals of up to 30 years or more, and planning mining nearly 80 years into the future is absurd. These massive projects disturb very extensive tracts of land, destroy large tracts of native ecosystem and wildlife habitat, and induce rapid changes in local communities and economies in profound, significant, and often irreversible ways. It is highly important that permits expire within reasonable periods of time so that federal, state, regional, and local governments, and especially local communities, may reevaluate such projects in accordance with society's constantly changing needs.</p>	Included in summary above

	<p>The durations of the permits of currently approved phosphate strip mines are unacceptable, especially when the extensive negative impacts are considered collectively, that is cumulatively. To approve four new mines with such extremely excessive durations is unconscionable. Considering the 300,000 plus acres of past phosphate mining impacts, with the existing mine permits considered collectively, and adding the four projects described in the DAEIS, the cumulative impact will be the utter destruction of much of eastern west-central Florida, plus potentially massive impacts to "downstream" jurisdictions and coastal communities such as Charlotte, Lee, and Sarasota counties.</p> <p>Issuing permits and approvals for phosphate strip mining for such extended durations represents an injustice to society. Such long-term approvals preclude affected communities from being able to respond to changes in societal needs including, but not limited to, protection of public health and safety, changes in the economy, natural disasters and disaster response, increases in the need for local natural resources including food from traditional local agriculture. It is therefore essential that only the shortest possible permit durations be granted.</p>	Included in summary above
	<p>Recommendation: In no case should any phosphate strip mining permits be issued or granted for time periods extending five years. Within this 5-year span, permit compliance and local community must be reviewed at least annually. Also, because phosphate strip mine "extensions" are actually "new" mining, all extensions must be permitted as individual phosphate strip mines. No projects which do not currently have permits should be granted until the historic cumulative impacts of phosphate strip mining in the CFPD have been completely evaluated, and until phosphate strip mining technologies can be developed which may allow some limited mining to take place in an environmentally acceptable manner. Also, the cumulative analysis is needed in order to determine the additive impacts and contribution of other factors by the currently permitted or operating mines.</p>	Included in summary above
	The Draft AEIS does not adequately address radiation impacts.	Chapters 3 and 4 of the Final AEIS have expanded discussions of radiation impacts as related to phosphate mining.
	<p>3PR strongly objects and questions the accuracy of the information, the adequacy of the environmental analysis, and indeed the validity of the DAEIS, because of the fact that the well-known problem of generally elevated low-level radiation and the assimilation of Radium-226 in wildlife and plants is not treated with great concern. The scientific studies and publications of government, prestigious research institutions, universities, and others warn of this potential health and safety issue which faces the environment and human population alike. Even conservative authors caution that "we assume that low doses also cause human health effects to a directly proportional, but smaller degree" (FIPR 1986b).</p>	Included in summary above

	<p>Of great potential concern, and one of the largest potential problems with phosphate strip mining, is that birds are attracted to clay waste ponds, mine cuts, and wetlands created, either intentionally or unintentionally, on or near mined lands, or where discharges have taken place. Research suggests that these areas may act as a kind of radiation poisoning stations for wildlife, because the radioactive isotope Radium-226 (which reportedly has a half-life of 1601 years and decays into Radon-222, a radioactive gas) has been commonly shown to accumulate in the bones of fish and birds feeding in these areas, particular in the clay waste ponds referred to by the Applicants in this section. It was reported that "the average bone concentration in waterfowl from settling ponds in central Florida was about 4 times the recommended maximum for humans" (FIPR 1986a & 1986b). This issue is reinforced by additional research which concluded that "As a result of mining and processing operations, most of the radioelements accumulate in the waste clays. Radium and thorium also are present in the gypsum stacks and uranium is present in the acid products and fertilizer" (FIPR 1985). Runoff and leachate from phosphate processing sources into ditches, wetlands, and other areas which may be utilized by plants, animals, or humans, may also be a concern as indicated by the conclusion that the EPA "... does not allow the use of central Florida gypsum. Material from central Florida generally contains about twenty-five pCi/g" (FIPR 1987).</p>	Included in summary above
	<p>3PR questions the accuracy of information and the adequacy of environmental analyses in the DAEIS where elevated levels of low-level radiation are concerned, because nowhere is the mining-induced phenomenon low-level radiation treated with the proper concern, especially so considering the potential for such radiation to negatively impact human health, nor does it analyze these documented concerns in regard to overall "Protection of the Environment", which is the stated purpose of NEPA.</p>	Included in summary above
	<p>As for Radon-222, "When radon undergoes radioactive breakdown, it decays into other radioactive elements called radon daughters. Radon daughters are solids, not gases, and stick to surfaces such as dust particles in the air. If contaminated dust is inhaled, these particles can adhere to the airways of the lung. As these radioactive dust particles break down further, they release small bursts of energy which can damage lung tissue and therefore increase the risk of developing lung cancer. In general, the risk increases as the level of radon and the length of exposure increases." (MASS 2012).</p>	Included in summary above

	<p>Additionally, there was not much permanent water at many of the sites prior to mining. This may greatly compound the issue of radium in birds, fish, aquatic plants, and other wildlife. It is also reported that radioactive isotopes travel with phosphate fertilizers and are taken up by tobacco and other agricultural plants (FIPR 1983). This may present a particular problem for other animals, including animals from distant regions, which consume such radioactive phosphate mine wildlife because they are attracted to the many wet and submerged areas resulting from the extensive excavations associated with mining. The apparent foundation of this problem is the accumulation of radiation in aquatic plants, especially small, thalloid, floating species eaten by water fowl, which grow quickly in the higher nutrient waters associated with mined lands.</p>	Included in summary above
	<p>The presence of such elevated concentrations of Radium-226 in wildlife, particularly in mobile wildlife such as birds, is potentially of great concern. Elevated radiation in the phosphate strip mining district in general, represents a very large and highly significant issue of contention which is not adequately addressed in the DAEIS. 3PR therefore questions the accuracy of information and adequacy of the environmental analysis in the DAEIS, because it does not consider this important health and safety issue which may have the potential to affect the human population and the precious and irreplaceable plants and animals of Florida. Additionally, this readily available research, as well as considerable other published research, is not cited in the Chapter 7 references of the DAEIS.</p>	Included in summary above
	<p>FIPR. 1983. Polonium-210 and Lead-210 in Food and Tobacco Products: A Review of the Parameters and an Estimate of Potential Exposure and Dose. Institute for Phosphate Research, No. 05-DFP-015.</p> <p>* Summary: This research addresses some aspects of the accumulation of Polonium and Lead in foods and tobacco. It indicates that these contaminants are mobile through various transport mechanisms, such as food chain transport, including inhalation exposure involving tobacco. It also provides an enlightening description of the process of aerial deposition.</p> <p>* Substantive Comment: An important and relevant finding of this research is that "For most food items and tobacco, aerosol deposition seems to be the principal mode of Pb-210 and Po-210 entry. This feature is of particular concern for leafy vegetables. As a result, only fruit-bearing crops such as citrus, berries, and cane fruits should be grown on phosphate-reclaimed land." 3PR questions with reasonable basis the adequacy of environmental analyses in the DAEIS in regard to elevated low-level radiation associated with phosphate mining. The DAEIS does not fully examine and address potential risks to humans and the environment of low-level radiation exposure, particular cumulative exposure and impacts.</p>	Included in summary above

	<p>Recommendation: The following change/revisions are necessary in order to address the inadequacies of the DAEIS: Comprehensive studies are needed which include, but are not limited to, epidemiological investigations assessing the potential affects of elevated values of low-level radiation relating to phosphate strip mining and related operations. Such studies must be comprehensive, employ the highest and best state of current technology, and be conducted in a peer review environment. The studies should not only measure individual source, but all cumulative effects.</p>	Included in summary above
	<p>FIPR. 1986a. Environmental Contaminants in Birds: Phosphate-Mine and Natural Wetlands. FIPR No. 05-003-045. Bartow, Fla.</p> <p>* Summary: This paper provides basic investigation of the accumulation of Radium in humans, birds, fish, and certain vegetation via food chains. It reports, among other results of considerable concern, that "the average bone concentration (of Radium-226) in waterfowl from settling ponds in central Florida was about 4 times the recommended maximum for humans."</p> <p>* Substantive Comment: 3PR questions the adequacy of the environmental analyses in the DAEIS, because the results of this research inspire great concern for the birdlife, and the general environment, in and near phosphate strip mines, or more specifically waste clay disposal sites (CSAs). The DAEIS mostly avoids sincere discussion of the elevated low-level radiation risks as it relates to phosphate strip mining and other phosphate related industry. Human health and the health of the environment may be at risk from phosphate strip mining activities.</p>	Included in summary above
	<p>FIPR. 1986b. Radiation and Your Environment. Florida Institute for Phosphate Research, No. 05-000-036. Bartow, Fla.</p> <p>* Summary: Provides general information, mainly about low-level radiation, ionizing radiation, radon, units of measurement and dose measurement, and well as some household tips. Provides a "Radon Risk Evaluation Chart".</p> <p>* Substantive Comment: The following statement made in this publication re-enforces the need for current, updated, epidemiological studies of low-level radiation risks, especially where cumulative effects may be involved: "We do know that large doses of radiation given at high dose rates can cause cancers and genetic disorders, but we do not know for sure that low doses and dose rates cause these effects. For protective reasons (radiation regulations and standards), we assume that low doses also cause human health effects to a directly proportional, but smaller degree".</p>	Included in summary above

	<p>FIPR. 1987. Radioelement Migration in Natural and Mined Phosphate Terrains. Florida Institute for Phosphate Research, No. 05-002-027. Bartow, Fla.</p> <p>* Summary: As a result of mining and processing operations, most of the radioelements accumulate in the waste clays. Radium and thorium also are present in the gypsum stacks and uranium is present in the acid products and fertilizer.</p> <p>Substantive Comment: 3PR questions the accuracy of the information and adequacy of the environmental analyses in the DAEIS, because a body of research exists which suggests that low-level radiation is a potential threat to humans and the environment, and also to the FAS, as indicated below. Two of the primary transport mechanisms through which the FAS may become contaminated is along well casings and via "induced recharge". The research further validates the radiation problem, and also raises cause for concern due increased vulnerability of the FAS from consumptive use / withdrawals. (Also, see several previous 3PR comments).</p>	Included in summary above
	<p>The following findings are notable:</p> <p>"The regional distribution of uranium and radium in groundwaters and surface waters appears not to have been disturbed. The one possible exception is in the Floridian Aquifer in the immediate areas of mining.' Higher than normal, though not exceptionally unusual, uranium concentration values are observed. We speculate that this may be related in some way to enhanced industrial water useage".</p> <p>"A large proportion of the radioelements in phosphate ore ends up in the clay even before the adsorption process hypothesized above. We calculate that approximately 45% of the uranium and radium, and 55% of the thorium in the original matrix is in the clays that are removed by the washing process. In the gypsum residue resulting from further treatment stages are found 3% of the uranium, 30% of the radium, and 35% of the thorium of the original matrix. Less than 10% of the radium and thorium end up in fertilizer and chemical products, but as much as 30% of the uranium does".</p>	Included in summary above

	<p>Lyman, Gary H. (MD, MPH) et al. 1985. Association of Leukemia with Radium Groundwater Contamination. JAMA, 254(5):621-626.</p> <p>* Summary: Radiation exposure, including the ingestion of radium, has been causally associated with leukemia in man. Groundwater samples from 27 counties on or near Florida phosphate lands were found to exceed 5 pCi/L total radium in 12.4% of measurements. The incidence of leukemia was greater in those counties with high levels of radium contamination (>10% of the samples contaminated) than in those with low levels of contamination. Rank correlation coefficients of 0.56 and 0.45 were observed between the radium contamination level and the incidence of total leukemia and acute myeloid leukemia, respectively. The standardized incidence density ratio for those in high-contamination counties was 1.5 for total leukemia and 2.0 for acute myeloid leukemia. Further investigation is necessary, however, before a causal relationship between groundwater radium content and human leukemia can be established.</p> <p>* Substantive Comment: 3PR questions the adequacy of the environmental analyses in the DAEIS, because this paper, and several others, specifically report statistically elevated cancer risks from human exposure to Radium-226 contaminated groundwater. Numerous other published research report elevated low-level radiation associated with various sources within the CFPD, particularly on mined land and at waste clay disposal sites. The Lyman studies were published in the prestigious, peer-reviewed Journal of the American Medical Association (JAMA).</p>	Included in summary above
	<p>Recommendation: The body of research reporting radiation concerns relating to the phosphate strip mining and processing industry speaks for itself in terms of raising concern. Authors have indicated that elevated radiation means elevated risks, and warn about consuming food items from phosphate lands. As suggested elsewhere in</p> <p>3PR's comments, comprehensive, multi-team, "independent" "peer reviewed" studies are indicated in order to determine the level of potential threat to humans and the environment. Studies funded by the phosphate industry should be discarded, in favor of more objective, and more credible research conducted by leading medical researchers, institutions, and epidemiologists, such as Lyman, Stockwell, and Gofman.</p>	Included in summary above

	<p>MASS_2012. Public Health Fact Sheet on Radon. Commonwealth of Massachusetts. Accessed 10-Jul-2012: www.mass.gov</p> <p>* Summary: Provides basic facts concerning Radon, and described health risks. "Radon is a naturally occurring radioactive gas. It is produced in the ground through the normal decay of uranium and radium. As it decays, radon produces new radioactive elements called radon daughters or decay products. Radon and radon daughters cannot be detected by human senses because they are colorless, odorless, and tasteless." "When radon undergoes radioactive breakdown, it decays into other radioactive elements called radon daughters. Radon daughters are solids, not gases, and stick to surfaces such as dust particles in the air. If contaminated dust is inhaled, these particles can adhere to the airways of the lung. As these radioactive dust particles break down further, they release small bursts of energy which can damage lung tissue and therefore increase the risk of developing lung cancer. In general, the risk increases as the level of radon and the length of exposure increases."</p>	Included in summary above
	<p>Substantive Comment: Because the DAEIS is required to consider all significant environmental issues, it should fully evaluate the direct and cumulative risks associated with elevated Radon levels. The DAEIS is inadequate because, although elevated low-level radiation from Radium-226 and Radon-222 and its daughters are discussed, the document does not thoroughly evaluate the present and future risks potentially presented by increased low-level as a cumulative factor. This is inconsistent with the requirement "The NEPA process is intended to help public officials make decisions that are based on understanding of environmental consequences, and take actions that protect, restore, and enhance the environment" A point of some note which is provided in the "Fact Sheet" is that radon "daughters" adhere to dust particles in the air. Mining and construction sites are often very dusty, with potentially elevated concentrations of particulates, and particles from large areas of unconsolidated or sparsely vegetated land. It appears that more current studies may be necessary in order to objectively quantify any potential for elevated low-level radiation, including any associated risks to humans and the environment, including any cumulative effects which involve the various documented sources of increased low-level radiation associated with the phosphate industry.</p>	Included in summary above

	<p>Stockwell, Heather G., Lyman, Gary H., Waltz, Julie and Peters, John T. 1988. Lung Cancer in Florida, Risks Associated with Residence in the Central Florida Phosphate Mining Region. Am. J. Epidemiol. (1988) 128 (1): 78-84.</p> <p>* Summary: This research was a case-control study that included 25,398 cases of lung cancer among Florida residents. It was conducted to determine if residence in the central Florida phosphate mining region was associated with an increased risk of lung cancer. A twofold increase in lung cancer risk was observed among male nonsmokers who lived in the study area. Risks were elevated for all major lung cancer cell types.</p> <p>* Substantive Comment: 3PR questions the adequacy of the environmental analyses of the DAEIS because the document fails to appropriately evaluate low-level radiation levels which may be increased as a result of phosphate mining and other related processes and activities. The DAEIS fails to ensure that this phenomenon does not present risks and threats to public health, wildlife, and the environment. Other research also establishes that elevated low-level radiation exists within the CFPD, and potentially in association with some phosphate products, such as fertilizers, as well.</p> <p>* Recommendation: The public and environmental health issue must be completely evaluated. Comprehensive analyses and epidemiological studies are needed before additional phosphate strip mining permits are considered. (See other comments involving the issue of elevated radiation risks).</p>	Included in summary above
	<p>Gofman, John W. 1990. Radiation-induced cancer from low-dose exposure: an independent analysis. Committee for Nuclear Responsibility.</p> <p>* Summary: This research, and others, conclude that there is no safe dose or dose rate of ionizing radiation and that even the lowest conceivable doses present cancer risks. Gofman was an established authority on nuclear physics. Dr. John W. Gofman, M.D., Ph.D. Considered by some as one of the foremost independent authorities, John William Gofman was Professor Emeritus of Molecular and Cell Biology in the University of California at Berkeley, and Lecturer at the Department of Medicine, University of California School of Medicine at San Francisco. He is the author of several books and more than a hundred scientific papers in peer-review journals in the fields of nuclear / physical chemistry, coronary heart disease, ultra-centrifugal analysis of the serum lipoproteins, the relationship of human chromosomes to cancer, and the biological effects of radiation, with especial reference to causation of cancer and hereditary injury.</p> <p>* Substantive Comment: The DAEIS does not consider the potentially negative, cumulative, and harmful effects of exposure to increased low-level radiation resulting from the geologic impacts of phosphate strip mining, the distribution of mining products, and the contamination of foods and products (such as tobacco) from phosphate fertilizers.</p>	Included in summary above

	The Draft AEIS does not adequately address the issue of spills.	Additional discussion of the issues related to CSA spills has been included in Chapters 3 and 4 and Appendix D of the Final AEIS.
	It is not possible to estimate the number of spills which have occurred within the CFPD, or the impacts they have had both internally on mine lands, and externally. Monitoring is lacking, and spills are seldom reported, even less often are they documented, or well-documented, as is the example in the previous three photos.	Included in summary above
	Recommendation: Comprehensive full time monitoring and auditing of phosphate strip mines (past and present) and its related industries is critically needed in order identify and evaluate spills and other discharges in a timely fashion. An analysis of the required staff, resources, and "independent" funding sources is needed.	Included in summary above
	3PR questions the adequacy of the environmental analyses in the DAEIS, because it does not consider the phosphate industries history of accidental discharges and their inability to control them once they occur, as was the case with several known major spills, and an inestimable number of "unknown" spills may not have been recorded due to the lack of adequate monitoring/auditing of the vast expanses of mined land and ancillary or secondary industry. See Photos 1 and 2.	Included in summary above
	Leaking, seeping, discharges of effluents from mined lands are common, and are an ongoing problem with such massively altered landscapes as are created by the phosphate strip mining industry and it ancillary (or secondary, tertiary) industries. As commented earlier, large spills also occur, often continuing for extended periods before detected or controlled. The primary problems relate to the degree to which landscapes have been altered, the disposal of large volumes of waste clays and other discarded materials (sand, overburden, etc), and the problem of monitoring and auditing such vast, often difficult to access, expanses of property. See Photos 4, 5, and 6. At phosphate mines and mined land, the term "spill" is typically used in the context of pollutants or unwanted substances leaving mines or mined land. However, due to the post-mining condition of some mined properties, spills which occur internally may not be considered noteworthy. Of additional concern is the disposal of phosphogypsum and the potential for continued water quality degradation as a consequence of their closure and effective abandonment.	Included in summary above

	<p>(1) A comprehensive investigation and evaluation of the phosphate industry's history and record in relation to accidental discharges of effluents and other potential pollutants into surface waters, wetlands, and aquifers is critically needed. (2) Evaluate the history and ability of enforcing agencies to satisfactorily monitor and detect such discharges. (3) Conduct research to evaluate any long-term liabilities associated with phosphogypsum disposal and "gyp stack" closure in relation to impacts to water quality. (4) Conduct a survey of current and past phosphate strip mines to locate ongoing discharges into internal ecological areas, and to offsite properties, including ditches, drains, canals, and conveyances on road right-of-ways which drain into wetlands, rivers, streams, or other offsite areas. Review Photos 1 through 6, to understand a fraction of potential problems which can in no way be expressed in words!</p>	Included in summary above
	<p>A Florida Administrative Law Judge recently found that "Modern (phosphate) mining still has a devastating impact on the local natural environment." (J. Lawrence Johnston 2003).</p>	Comment acknowledged
	<p>Upon examination of the DAEIS it occurs to 3PR that there are some who do not know what an "Ecosystem" represents: An ecosystem is a community of animals and plants interacting with one another and with their physical environment. Ecosystems include physical and chemical components, such as soils, water, and nutrients that support the organisms living within them. These organisms may range from large animals and plants to microscopic bacteria. Ecosystems can be thought of as the interaction among all organisms in a given habitat. People are part of ecosystems. The health and well-being of human populations depends upon intact and carefully managed ecosystems and their components - organisms, soil, water, and nutrients.</p>	Comment acknowledged

	<p>Ecosystems and Biodiversity provide "services" that:</p> <ul style="list-style-type: none"> • Moderate weather extremes and their impacts. • Disperse seeds • Mitigate drought and floods. • Protect people from the sun's harmful ultraviolet rays. • Cycle and move nutrients. • Protect stream and river channels and coastal shores from erosion • Detoxify and decompose wastes. • Control the vast majority of agricultural pests. • Maintain biodiversity. • Generate and preserve soils and renew their fertility. • Partially stabilize climate. • Purify the air and water. • Partially stabilize climate. • Regulate disease carrying organisms. • Pollinate crops and natural vegetation. (Daily et al 1997). 	Comment acknowledged
	<p>The recognition of the value of ecosystems and the natural environment is conspicuously absent, virtually omitted from much of the DAEIS. 3PR therefore expounds on this primary issue throughout its comments. "It is the web of live which supports humanity"; a fact which is fatally ignored throughout the DAEIS.</p>	Comment acknowledged
	<p>Lisa F. Garcia, senior adviser to the EPA administrator for environmental justice, emphasized the importance of advancing environmental justice and the goals of Plan EJ 2014, "Far too often, and for far too long, low-income, minority and tribal communities have lived in the shadows of some of the worst pollution, holding back progress in the places where they raise their families and grow their businesses. Today's release of Plan EJ 2014 underscores Jackson's ongoing commitment to ensuring that all communities have access to clean air, water and land, and that all Americans have a voice in this environmental conversation."</p>	Comment acknowledged
	<p>"The human economy depends upon the services performed "for free" by ecosystems. The ecosystem services supplied annually are worth many trillions of dollars. Economic development that destroys habitats and impairs services create costs to humanity over the long term that may greatly exceed the short-term economic benefits or the development. These costs are generally hidden from traditional economic accounting, but are nonetheless real and are usually borne by society at large. Tragically, a short-term focus in land-use decisions often sets in motion potentially great costs to be borne by future generations" (Daily 1997).</p>	Comment acknowledged

	<p>"Unprecedented changes are taking place in the ecosystems of the world."</p> <p>"Recent evidence demonstrates that both the magnitude and stability of ecosystem functioning are likely to be significantly altered by declines in local diversity, especially when genetic diversity reaches the low levels of managed ecosystems" (Naeem 1999).</p> <ul style="list-style-type: none"> • Human impacts on global biodiversity have been dramatic, resulting in unprecedented losses of global biodiversity at all levels, from genes and species to entire ecosystems. • Local declines in biodiversity are even more dramatic than global declines. • Many ecosystem processes are sensitive to declines in biodiversity. • Changes in the identity and abundance of species in an ecosystem can be as important as changes in biodiversity in influencing ecosystem process. 	Comment acknowledged
	<p>In addition to all other issues commented on herein, 3PR has determined that a very large number of errors, omissions and internal inconsistencies exists in the DAEIS. These include, but are not limited, inconsistencies in various wetland acreages of wetlands to be dredged, mining and reclamation time periods, incomplete and inaccurate tables, large quantities of included irrelevant, erroneous, and misleading pro- phosphate-mining content which read like phosphate company sponsored newspaper and TV ads, grammatical and organization errors, and countless omissions of important data, analyses, tables, maps and exhibits readily available from public sources. Often highly significant issues and concerns are ignored, omitted, or summarily dismissed with little or no analysis or comment. The DAEIS is obviously, for many reasons, not a product which should have been presented to the public for review and comment. The USCOE must consider the unnecessary expenditures of time and resources, and other impacts to the citizens, businesses, and other organizations which are concerned with phosphate strip mining, in releasing such an inappropriate proposal for public review and comment. The DAEIS should be concise, accurate, objective, and soundly supported by data and analysis developed and presented independent of the Applicants.</p>	<p>The Final AEIS was corrected, expanded, and updated in response to comments and information provided by the public in response to the Draft AEIS. The Draft AEIS and the Final AEIS contain information from a variety of sources, including the applicants. The USACE is responsible for the content of the Draft AEIS and the Final AEIS.</p>
	<p>Recommendation:</p> <p>The diverse, extreme, and usually permanent impacts associated with phosphate strip mining must be considered honestly. A brief tour by air and ground through the phosphate mining district will dispel any myths concerning the level of impacts and destruction created by this industry. Seeing is knowing and believing.</p>	Comment acknowledged

	Questions regarding whether phosphate strip mining should take place must be decided in an academic environment, while seeking out and acknowledging the difficult problems which must be overcome in order to find methods of phosphate mining which impart only acceptable impacts. Phosphate mining is an industry in business for profit. From the industry's perspective its mission is no doubt to increase efficiency and make more money. Profit must in no way be the basis of decision-making where the NEPA mission of "Protection of the Environment" is concerned.	Comment acknowledged
	Conspicuously missing from the DAEIS are photographs of the many aspects of phosphate strip mining which would be informative to the public, and which would genuinely characterize and depict phosphate strip mining activities, etc. The body of the document contains exactly 1 photograph of a dredge peacefully floating in a lake. In reviewing the DAEIS a question arises as to how much time the USCOE personnel listed in the "List of Preparers" actually spent in active and reclaimed phosphate strip mines. Most how visit the phosphate mining district return with many photographs, a few artifacts, and clay-gummy shoes.	Comment acknowledged
	The current age is a digital one. We live in a "visual" world. Literacy is at an all time low in central Florida, with graduates reading at or below 8-grade levels. Language is also a barrier (discussed elsewhere). The DAEIS is devoid of adequate visual representation and communication appropriate to inform the general public concerning phosphate mining, especially materials which would be appropriate to educate the proportionally high minority and low-income populations of Hardee and DeSoto counties some of which exhibit low levels of educational attainment.	Comment acknowledged
	In Chapter 8 "List of Preparers", the DAEIS does not list any regional experts, or any experts, qualified in the fields of systems ecology, plant ecology, or botany. Of the specialist cited as preparers of the DAEIS, Steven Gong (CH2M-Hill, Project Manager) has a zoology degree from the University of Florida, and Tunch Orsoy, (USCOE, Ecology Lead) has a marine science degree from the University of South Florida. None of the officials or scientists listed as "preparers" possessed (or possess) regionally recognized expertise with the environs of the Southwestern Florida Flatwoods Ecoregion. As commented on later, NEPA requires the agencies to be sufficiently capable of independently evaluating an EIS, including the work done by others, even though external consultants and assistance may have been retained for much of the work.	The preparers of the Draft AEIS and the Final AEIS had sufficient expertise and experience to produce those documents. The USACE staff responsible for the Draft AEIS and the Final AEIS, and the staff that also reviewed the documents from the cooperating agencies, EPA and FDEP, also had sufficient expertise.

	<p>3PR questions the accuracy of information in the DAEIS, because the USCOE project team does not individually or collectively possess the full in-house capability of developing a document which is technically sufficient and competent, or which would be necessary in order to evaluate the work of external consultants and sources, thereby assuring NEPA compliance. The DAEIS is therefore inappropriate for ensuring the protection of important native ecosystems and other biota, including upland ecosystems and other related considerations.</p> <p>40 CFR 1507.2 Agency capability to comply</p> <p>Each agency shall be capable (in terms of personnel and other resources) of complying with the requirements enumerated below. Such compliance may include use of other's resources, but the using agency shall itself have sufficient capability to evaluate what others do for it.</p> <p>Ecological impacts are predicted by "professional knowledge of plant and animal life and their habitat requirements, professional judgment of the biotic community's ability to withstand or respond to disturbance, professional experience with the impending changes and impacts, and results from similar studies, and common sense (a biologist who simply lists the names of organisms observed on the site - without an interpretation of key life histories, ecological interrelationships, and habitat requirements -- misses the primary intent of the environmental impact report" (Rau & Wooten 1980).</p>	<p>The preparers of the Draft AEIS and the Final AEIS had sufficient expertise and experience to produce those documents. The USACE staff responsible for the Draft AEIS and the Final AEIS, and the staff that also reviewed the documents from the cooperating agencies, EPA and FDEP, also had sufficient expertise.</p>
	<p>The CFPD is the source of 5 major rivers and includes part of the drainage basins of 2 others (Hillsborough River and Withlacoochee River), 1 minor river (Braden River), approximately 150 named creeks and streams, and large number of unnamed tributaries and small streams or water courses (Figure 2).</p>	<p>Comment acknowledged</p>
	<p>The southern half of the CFPD in the Southwestern Florida Flatwoods Ecoregion supports one of the most dense and diverse mosaics of wildlife habitats and ecosystems extant in central and south Florida. The wildlife habitat in the CFPD represents the bulk of the little remaining high-quality wilderness in west-central Florida. This region is one of the last great repositories of Florida wilderness, and the most invaluable, self-renewing, essential and irreplaceable upstream asset upon which coastal fisheries, rookeries, and marine spawning grounds from Hillsborough County southwards to southern Lee County utterly depend. It provides primary "ecosystem services", that is, environmental sustenance for humans, animals and plant life in west-central Florida.</p>	<p>Comment acknowledged</p>

	As stated, the vast geographic footprint of the CFPD extends across many unique landscapes, ecosystems, and physiographic features. These physiographic features/regions, generally depicted in Figure 3 (based on, White 1970), are the result of distinct, and mostly independent, natural histories. Each is characterized by a unique set of soils, geology, and geomorphology. As a result of unique natural histories and other regionally specific attributes, and because of the isolating factors and pressure they apply, each region supports distinct elements of flora and fauna, and distinctly different ecosystems.	Comment acknowledged
	The terms "geomorphology", "biogeography", "endemism", "endemic", "genetic", "genetic diversity", and "critical habitat" (except in the glossary), do not appear in anywhere in the DAEIS. The DAEIS does contain some discussion of physiography (i.e., "physiographic" regions), but not in the context of plant and animal endemism, specialization of ecosystems, regional aesthetic character and value, and certainly not in terms of the NEPA EIS requirement of "Protection of the Environment".	Comment acknowledged
	"At a global scale, even at the lowest estimated current extinction rate, about half of all species could be extinct within 100 years. Such an event would be similar in magnitude to the five mass extinction events in the 3.5 billion year history of life on earth." (Naem 1999). In view the chart below it must be considered that "genetic" extinctions occur when a significant portion of a local gene pool is lost/depleted, or when essential genetic traits necessary for reproduction and survival are lost or weakened.	Comment acknowledged
	<p>"Unprecedented changes are taking place in the ecosystems of the world."</p> <p>"Recent evidence demonstrates that both the magnitude and stability of ecosystem functioning are likely to be significantly altered by declines in local diversity, especially when genetic diversity reaches the low levels of managed ecosystems" (Naem 1999).</p> <ul style="list-style-type: none"> • Human impacts on global biodiversity have been dramatic, resulting in unprecedented losses of global biodiversity at all levels, from genes and species to entire ecosystems. • Local declines in biodiversity are even more dramatic than global declines. • Many ecosystem processes are sensitive to declines in biodiversity. <p>Changes in the identity and abundance of species in an ecosystem can be as important as changes in biodiversity in influencing ecosystem process.</p>	Comment acknowledged

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	<p>Of 5,000 comments, the USCOE listed 4 "primary" issues, and 11 "other" issues. Most of these issues are general. The first issue, "Ecological resources, including the loss of wetlands and mitigation of such losses", should be restated so that its meaning is clear. It should not presume "losses" or the "mitigation of such losses". 3PR questions the accuracy of the information in the DAEIS, because this important issue is inappropriately combined with the entirely separate issue of "mitigation".</p> <p>Refer to other 3PR comments in regard to the USCOE excessively relying on the Applicants, associated entities, and paid consultants for DAEIS content, and the predetermination of permit and mining approval which permeates the document.</p> <p>* Recommendation: 3PR recommends that the first issue, "Ecological resources, including the loss of wetlands and mitigation of such losses, be bifurcated into two issues: (1) "Large-scale and cumulative loss of ecological resources and wetlands"; and (2) "Potential for mitigation of environmental impacts".</p>	<p>The issue identified was discussed in the section of the Draft AEIS on scoping, and is a general summation of comments received during that process. In the Draft AEIS and the Final AEIS, impacts to ecological resources including wetlands and mitigation of wetland impacts are addressed in Chapters 4 and 5 respectively.</p>
	<p>3PR contends that "Alternative-1 ("No Mining") is the only acceptable alternative, because even this alternative will result in very extensive negative impacts through continued phosphate strip mining as the industry completes its permitted projects.</p>	<p>Comment acknowledged</p>
	<p>This is one of many prime examples illustrating how the phosphate strip mining industry has destroyed, or contributed to the destruction of resources which were hugely valuable to society. Today, Bartow is a very small town. It is the original county seat for Polk County, but because of phosphate strip mining early in its history, its growth was restricted and Lakeland became the county's major city. Mulberry, Ft. Meade, and now the City of Bowling Green has suffered an even a worse fate. Next in line will be the communities of Wauchula, Ona and Zolfo Springs.</p>	<p>Comment acknowledged</p>
	<p>Photo 6 below depicts a waste clay disposal site (CSA) (or other massive containment) of which there are a great many already occupying the west-central Florida landscape. Many phosphate strip mining impacts represent effectively permanent liabilities to the environment and create effectively immovable barriers to an expanding human society which has diverse needs for space, potable water, green space, safe recreation, and a clean and healthy natural environment.</p>	<p>Comment acknowledged</p>
	<p>The references upon which the DAEIS was presumably based are not annotated. It is therefore not possible to know how they are believed relevant or how their contents might have been interpreted and/or applied in formulating the various sections of the document. In many instance citations are made, but there is no means of determining how, why, or what information may have been considered or included.</p>	<p>Comment acknowledged</p>

	Numerous on-site, independent environmental studies need to be conducted throughout the CFPD, and well beyond, especially "downstream", that is, down the rivers and streams to Charlotte Harbor and coastal zones of the gulf coast of Florida where the pollution and frequent toxic spills of the phosphate industry will ultimately find there way.	As described in the Draft EIS and the Final AEIS, the geographic scope of several of the resource categories considered extend down into Charlotte Harbor.
	It is unconscionable to entertain the concept of destroying an entire region of subtropical Florida, involving nearly 60,000 acres, supporting billions of animals, plants, and other living organisms which comprise the natural environment, purely for the benefit of a single industry. The life-giving biotic systems which would be lost provide sustenance, water, living space, recreation, and climate moderation. These natural systems constitute the essential biological and physical base which support and sustain human existence. Their destruction places at risk public health, properties and property values, economies, and important resources extending far outside and downstream of the actual confines of the CFPD. Many of these liabilities extend well into the future, and some into perpetuity. Phosphate strip mining sacrifices the environmental heritage of mankind for the short term profits of those not sustaining these impacts. If no mining were to occur, these large tracts of land would potentially provide space, agriculture, and water for millions of people. Such disregard for the environment and humanity is in stark contrast to the stated purpose of NEPA, which is "Protection of the Environment" ⁸ .	In accordance with applicable regulations and guidelines, the analyses of direct and indirect effects in Chapter 4 of the Final AEIS considers the four proposed actions (the Applicants' Preferred Alternatives) and four offsite alternatives identified through the screening process described in Chapter 2 and Appendix B. The cumulative impacts analysis in Chapter 4 considers the impact of all past, present, and reasonably foreseeable actions, including the four proposed actions and two reasonably foreseeable mines.
	Phosphate mining is a non-sustainable, non-renewable activity, and its extraction has already been utterly disastrous to a region of approximately 350,000 acres. Reclaimed phosphate lands, as attempts at reestablishing native ecosystems, are well-documented failures in most every regard. With such a horrendous environmental record, issuing new approvals for additional phosphate strip mining in west-central Florida is in no way acceptable.	In accordance with applicable regulations and guidelines, the analyses of direct and indirect effects in Chapter 4 of the Final AEIS considers the four proposed actions (the Applicants' Preferred Alternatives) and four offsite alternatives identified through the screening process described in Chapter 2 and Appendix B. The cumulative impacts analysis in Chapter 4 considers the impact of all past, present, and reasonably foreseeable actions, including the four proposed actions and two reasonably foreseeable mines.

	<p>Hazen and Sawyer. 2003. Hardee County, Florida: Economic Impact of the Ona mine to Hardee County. Final Report, July 28, 2003. Hardee County Board of County Commissioners, by Grace Johns, Hazen and Sawyer, Environmental Engineers and Scientists.</p> <p>* Summary: Evaluates the potential economic effects to Hardee County from the proposed Ona Mine located in western Hardee County. This analysis estimates the change in employment and income to Hardee County residents that would be generated from the Ona mine relative to land uses on the Ona Property that would take place under baseline conditions. Presents a reasonable scenario of the potential land use given the best available information. Land use of the Ona Property under the baseline or “no-mining” scenario was based on reasonable assumptions of how western Hardee County would likely develop if no additional land was mined. All baseline land uses are consistent with Hardee County housing projections from the University of Florida Bureau of Economic and Business Research and historic agricultural acreage trends in Hardee County and in Florida from the Florida Agricultural Statistics Service.</p> <p>* Substantive Comment: (Refer to other comments where cited, including, but not limited to "Environmental Justice" comments).</p>	Comment acknowledged
	<p>Phosphate mining has often been presented by the mining industry as a "temporary" disturbance of land. However, it is unrealistic and inaccurate to assert that a 30-plus year mining project is a "temporary" disturbance, or that large-scale removal, disturbance, mixing of native soils, and construction of CSAs and phosphogypsum stacks, maintenance corridors, ditches, berms, pipelines, and processing facilities, will result in anything other than "major", "long-term", and complete destruction to native ecosystems, as it has with phosphate strip mining in the past.</p>	<p>In accordance with applicable regulations and guidelines, the analyses of direct and indirect effects in Chapter 4 of the Final AEIS considers the four proposed actions (the Applicants' Preferred Alternatives) and four offsite alternatives identified through the screening process described in Chapter 2 and Appendix B. The cumulative impacts analysis in Chapter 4 considers the impact of all past, present, and reasonably foreseeable actions, including the four proposed actions and two reasonably foreseeable mines. For some resource categories, the duration of impacts and time required for mitigation of those impacts is a consideration in the determination of degree or magnitude of impact, and the significance of impact.</p>
	<p>The Draft AEIS did not adequately address the issue of climate change and sea level rise.</p>	<p>The potential effects of phosphate mining on climate change and sea level rise are addressed in Chapter 4 of the Final AEIS.</p>

	<p>CHNEP. 2010. Charlotte Harbor Regional Climate Change Vulnerability Assessment. Charlotte Harbor National Estuary Program. Port Charlotte, Fla.</p> <p>* Summary: Summarizes "Climate Change" as it may affect areas monitored by the CHNEP, and provides a general vulnerability discussion.</p> <p>* Substantive Comment: 3PR questions the adequacy of environmental analyses and the accuracy of the information contained in the DAEIS, because the projected effects of the phenomenon of climate change have not been thoroughly examined in regard to its impacts to ecosystems and the environment, including, but not limited to, forced migration of animals and the potential inability of plant and vegetative communities to adapt. 3PR also questions the merits of alternatives other than Alternative-1 ("No Action" / "no permit") which are presented in the DAEIS, in part because of the excessively long permit terms. Rises in sea levels have recently been projected to reach as high as 2 meters by the year 2100 (Pfeffer 2008). Such changes will have profound effects on coastal communities, potentially requiring a slow evacuation of the majority of Florida's population (which is concentrated within a few miles of the coast), and the complete restructuring of business and society inland. Not planning for these changes by permitting inland barriers, and large-scale loss of farmland to phosphate strip mining, may not be in the interest of good land-use planning.</p>	<p>Included in summary above</p>
	<p>Changes in climate patterns related to global warming are significant concerns for long-range environmental planning, and even short-range planning. Climate change and ozone depletion will affect humans and the natural environment and, in fact, have already had profound negative impacts in Antarctica, where "krill" (the main source of food for larger animals, including seals) has declined as much as 80% during the last 30 years (Reid et al 2010). Increased atmospheric temperatures and concomitant elevated sea levels are causing, among other serious problems, ocean encroachment of coastal lands which will drive coastal communities inland, and which will reduce inland areas as watercourses become wider and deeper. Wetlands and lowlands also will become submerged or inundated for longer periods.</p>	<p>Included in summary above <u>u</u></p>
	<p>Pfeffer, W.T., Harper, J.T., O'Neel, S. 2008. "Kinematic Constraints on Glacier Contributions to 21st- Century Sea-Level Rise". Science 321 (5894): 1340–3.</p> <p>* Summary: Analyzes global warming and sea level rise (SLR).</p> <p>* Substantive Comment: (See CHNEP. 2010, above).</p>	<p>Included in summary above</p>

	<p>Reid, K. et al. 2010. Krill population dynamics at South Georgia: implications for ecosystem-based fisheries management. Marine Ecology-progress Series - MAR ECOL-PROGR SER, vol. 399, pp. 243-252. Summary: Analysis of Krill-based food web in Antarctica. Krill populations down by more than 80% due to global warming effect on sea ice plankton.</p> <p>* Substantive Comment: (See CHENP 2010 reference, and comment).</p>	Included in summary above
Terry Worthington, United Way of Central Florida	I respectfully urge that the AEIS economics analysis take into account the Phosphate Industry's impact on local non-profit agencies.	Comment acknowledged.
Les Alderman, Florida Association of Mitigation Bankers	<p>Regarding the importance of hydrology, the Draft AEIS says in section 5.3.4, "The development of appropriate hydrology is of vital importance to wetland and stream mitigation. Hydrology has and continues to be one of the most challenging aspects of wetland and stream design. Hydrologic predictions for early wetland designs were simple, full of assumptions, and often proved to be inadequate in capturing the hydrologic processes of the targeted wetland systems. Today, the phosphate industry uses sophisticated integrated surface water/groundwater modeling to predict target hydrologic conditions in mitigation wetlands and streams. Today's advanced construction technology, such as laser and global positioning system (GPS)-guided earthmoving equipment, provides the means to precisely contour the land to achieve desired elevations and hydroperiods. Grading precision is particularly important for the design of shallow wetland systems that require subtle changes in elevation." We agree that predicting the post-reclamation hydrology has been a challenge historically, but we fail to see how advances in technology have addressed the issue, especially the ability to do more precise grading. The problems of the past have been the inability to predict the post-reclamation water table, and the tendency of some post-reclamation soils to continue to subside. Precision grading in these circumstances could just make the grading more precisely wrong. We believe the risk of unsuccessful mitigation on mined sites is understated in the Draft AEIS, and that the above discussion should reflect the issues that have plagued the industry's post-reclamation (on-site) mitigation in the past, rather than optimistic speculation about the ability of new technology to resolve these issues.</p>	The roles of risk in the functional assessments performed on proposed mitigation, upfront planning of mitigation including hydrology, and adaptive management are discussed in Chapter 5 of the Final AEIS. Examples of conditions used to address adaptive management are in Appendix I.

	<p>Regarding the minimum requirement for determining mitigation success, the Draft AEIS says in section 5.3.7, “The federal Section 404 program does not have minimum establishment periods for regulatory release of mitigation wetlands. Mitigation wetlands created to compensate impacts to waters of the United States are not considered for regulatory release at any specified time, only at the point when all success criteria are demonstrated to have been met.”</p> <p>We believe a more accurate representation of the minimum establishment period is in the Compensatory Mitigation Rule, which states, “The mitigation plan must provide for a monitoring period that is sufficient to demonstrate that the compensatory mitigation project has met performance standards, but not less than five years. A longer monitoring period must be required for aquatic resources with slow development rates (e.g., forested wetlands, bogs).”</p> <p>We respectfully request that the Final AEIS reflect the requirements of the Compensatory Mitigation Rule.</p>	<p>Chapter 5 of the Final AEIS has been updated to clarify how proposed mitigation for the four actions will have to comply with the 2008 Compensatory Mitigation Rule.</p>
	<p>Regarding the comparison of in-lieu fee programs to mitigation banks, the Draft AEIS states in section 5.5.2.2, “In contrast [to an in-lieu fee program], an established commercial bank may have less flexibility with regard to addressing watershed needs, due to banks typically being single projects. Also, a permittee may have fewer options for selection of a location to implement a private mitigation project.”</p> <p>We only imagine one set of circumstances in which a commercial mitigation bank could not address the watershed needs as well as an in-lieu fee program. The only way the commercial mitigation banker would have fewer options for selection of locations is if the in-lieu fee sponsor was a government agency exercising powers of eminent domain. Is this the intent of the statement above? If not, we believe the quoted statement above is erroneous, not consistent with the rationale that was used to support the adoption of the Compensatory Mitigation Rule and should be removed from the Final AEIS.</p>	<p>Comment acknowledged. The statement quoted is intended to illustrate some of the differences between mitigation banks and in-lieu fee mitigation, as described in the preamble to the 2008 Mitigation Rule, in a description of in-lieu fee mitigation.</p>

	<p>Regarding the discussion of “advance credits” in section 5.5.2.3, the Draft AEIS incorrectly characterizes mitigation banking as follows,</p> <p>“To address financial considerations that may be important to the development of a mitigation bank, a percentage of the total credits projected for the bank at maturity is regularly authorized for sale once adequate financial assurances are in place to guarantee completion of the mitigation bank site. These advance credits also require demonstration of a high likelihood of success (Federal Register, 1995). With a mitigation bank, most permitted impacts are mitigated in advance, with the operational bank being in place at the time of the permit application. However, this would not be the case with advance credits authorized to support initial development of a mitigation bank.” (emphasis added)</p> <p>The citation to the “Federal Guidance for the Establishment, Use and Operation of Mitigation Banks,” which was issued on November 28, 1995 is inappropriate because the 1995 Guidance was superseded by the Compensatory Mitigation Rule issued in 2008. Under the rule in effect today, only in-lieu fee programs receive “advance credits.” Therefore, the discussion of the risks associated with “advance credits” should be properly moved to the discussion of in-lieu fee programs in section 5.5.2.2.</p>	Comment acknowledged.
	<p>Regarding the Draft AEIS’s speculative forecast of the inability of commercial mitigation banks to meet the industry’s need as stated in the following passage from section 5.5.2.3,</p> <p>“The amount of commercial mitigation bank credits currently available for purchase by potential users within the Peace River and Myakka River watersheds would not exclusively satisfy the mitigation needs of the currently proposed phosphate mines. It is also unlikely that future commercial mitigation banks that may be developed would exclusively satisfy the mitigation needs of the currently proposed or future mines. However, the use of commercial mitigation banks in combination with other forms of mitigation (onsite and/or in-lieu fee) could be a feasible approach for the phosphate industry.” (emphasis added)</p> <p>Given the earliest proposed start date of 2019 (Alternative 4) and the latest proposed end date of 2050 (Alternative 3), we fail to understand why the Draft AEIS states it would be unlikely that commercial mitigation banks would be able to satisfy the needs of industry mitigation. In the 17 years since mitigation banking rules were adopted in Florida, 63 mitigation banks have been approved covering over two-thirds of the State. Our point is simple: Where there is demand for mitigation credits, it is reasonable to assume that supply will be developed to meet the demand, especially given the seven year gap before start-up and the 30-year duration of mining. We respectfully request that the speculative statement be deleted, and that a realistic appraisal of the market response to demand created by the industry be substituted in its place.</p>	Comment acknowledged

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	Regarding the discussion of single user mitigation banks developed by the industry in section 5.5.2.3, an important consideration is omitted. Commercial mitigation banks offer protection from the liability for mitigation performance. Establishing industry owned single user mitigation banks would, as the discussion implies, carry all the costs of a commercial mitigation bank, but without the key advantage of liability protection.	Comment acknowledged
	Regarding the conclusions to the mitigation options discussion in section 5.5.3, we strongly suggest that the conclusions address the hierarchy established in the Compensatory Mitigation Rule and in the U.S. Army Corps of Engineers' Memorandum for Record template used by Jacksonville District permit reviewers. The Draft AEIS discussion does not mention the hierarchy and treats all options equally, when in fact, by rule the options are not on equal footing. The failure to recognize the hierarchy in the Compensatory Mitigation Rule is a misleading omission of material fact that should be corrected in the Final AEIS.	Chapter 5 of the Final AEIS has been updated to clarify how proposed mitigation for the four actions will have to comply with the 2008 Compensatory Mitigation Rule, including meeting the mitigation preference hierarchy.
	Regarding the discussion of non-existent mitigation plans in section 5.6, we believe that the limitation cited for the industry having not submitted mitigation plans (i.e. not yet having approved jurisdictional determinations) must have by now been resolved, and that mitigation plans should be part of the Final AEIS. Given the extent of aquatic resource losses proposed, we believe it is fruitless to evaluate the alternatives without considering concrete plans to compensate for these losses. We respectfully request that the Final AEIS include a discussion of proposed mitigation plans, specifically addressing their consistency with the federal Compensatory Compensation Rule.	The mitigation for the four proposed actions' compliance with the 2008 Compensatory Mitigation Rule will be determined as part of the Section 404 review. As stated in the Final AEIS, the results of the 404(b)(1) and public interest reviews, including the proposed mitigation, for each project will be made available for public review and comment.
	Thank you for the hard work and thoughtful analysis that the Draft AEIS portrays. A comment letter such as this necessarily focuses on what we perceive as deficiencies or opportunities to improve the document. On the positive side, we find much to commend the Draft AEIS, but in the interest of time, we refrain from itemizing them. Know, however, that the industry appreciates the work and support of the U.S. Army Corps of Engineers and its cooperating agencies in this endeavor.	Comment acknowledged
Paul Kripli	This is a tragedy and needs to stop. The Phosphate is causing terrible environmental damage and polluting our water.	The environmental consequences of the four proposed actions and the alternatives considered are discussed in Chapter 4 of the Final AEIS.
Margaret Wuerstle, Southwest Florida Regional Planning Council	The SWFRPC has determined that the Draft Areawide Environmental Impact Statement on Phosphate Mining in the Central Florida Phosphate District (DAEIS) is Regionally Significant and Inconsistent in its current form. Specifically, Chapters 4 and 5 are inadequate and preclude meaningful analysis. The SWFRPC requests that the U.S. Army Corps of Engineers (ACOE) prepare and circulate revised drafts of Chapters 4 and 5 for review and comment.	Comment acknowledged. Chapters 4 and 5 of the Final AEIS were updated and revised in response to comments received on the Draft AEIS.

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	Moreover, the SWF RPC recommends that the DAEIS include a recommended action alternative selection based upon the analysis that selects the alternative that has the least impact on the environment and provides the best health, safety and welfare for the people of Florida.	As part of the review of the four actions pursuant to the 404(b)(1) Guidelines, the Corps will identify a Least Environmentally Damaging Practicable Alternative for each project.
	<p>We question the adequacy of the environmental analysis given that the 25 alternatives are not addressed in a consistent fashion. The alternatives are grouped by "No Action" (1 alternative), "Proposed" (4 alternatives), "Foreseeable" (3 alternatives) and "Potential" (17 alternatives).</p> <p>We request that each analysis be completed by group on a stepwise basis. No action, then Proposed, then Proposed plus Foreseeable and finally, all alternatives together. It appears that the document is designed for it to be referenced for future mining permitting action particularly since "Foreseeable" mine alternatives include potential mining after the "Proposed" alternatives are completed and into the year 2070.</p> <p>Discussing the "foreseeable" mines individually avoids discussion of cumulative impacts. In addition, a cumulative analysis could help answer the question of when cumulative impacts would overwhelm the natural resources and degrade the economy of central and southwest Florida.</p>	The Final AEIS describes the potential direct and indirect effects of a No Action Alternative (as required by NEPA), the four Applicants' Preferred Alternatives (as required by NEPA and the Corps' NEPA implementing regulations), and four Offsite Alternatives. Two of the Offsite Alternatives are considered in the separate cumulative impact analysis as reasonably foreseeable future mines.
	<p>An overview of soils is provided in Chapter 3 of the DAEIS but no analysis of soils beyond hydric soils for wetland assessment is provided for the alternatives. Chapter 3, page 3-17, states "In the Peace River Basin, the most predominant soil group is AID with a total cover of 49 percent. Although these are sandy type soils, they are characterized by having high groundwater levels. Soil hydrologic group A covers approximately 18 percent of the Peace River Basin."</p> <p>Given that the most predominant group of soils for the basin are of high and low permeability, changes as a result of phosphate mining may be expected. We request that soil changes as a result of phosphate mining be assessed for the alternatives.</p>	Chapter 4 describes the potential direct and indirect effects of the proposed actions and their alternatives on soils.
	<p>We are doubtful of the accuracy of the groundwater resources analysis, comparing the "No Action" to the "Proposed" alternatives. The estimated end of rock production for Wingate Creek and South Pasture Wingate is 2013 and 2025, respectively. Under a "No Action" scenario, the withdrawal for these two mines would cease within the study period (except for a small amount associated with reclamation activities). Only two "Proposed" mines are analyzed in the DAEIS because South Pasture Extension and Wingate East are expansions of Wingate Creek and South Pasture Wingate and moving the existing Water Use Permits is proposed. If "No Action" occurred, the existing Water Use Permits from Wingate Creek and South Pasture Wingate expire at the end of mining and that water would not be withdrawn. Therefore we request cumulative groundwater modeling comparing the "No Action" and "Proposed" alternatives include reduced mining withdrawals at the appropriate periods.</p>	In the No Action Alternative - No Mining scenario, the groundwater usage for the existing mines, including Wingate Creek and South Pasture, ends when each of those mines closes and all activity including reclamation ends. The modeling of the cumulative impacts on groundwater considers existing mines ending their groundwater usage.

	The DAEIS assesses "Foreseeable" alternatives as if they have no impact because Water Use Permits would be moved from existing and "Proposed" mines and beneficiation plants. If the "Foreseeable" alternatives were not constructed, that water use would not occur. "Foreseeable" alternatives should be compared to "Proposed" mines within the same period (2025 to 2045) and to "No Action." This would compare "Proposed" to "Foreseeable" as alternative scenarios. In addition, we request an analysis adding the "Foreseeable" mine production after "Proposed."	Chapter 4 of the Final AEIS describes the potential direct and indirect effects of the four proposed actions and their alternatives on groundwater resources, and the potential cumulative effects of past, present, and reasonably foreseeable actions, including phosphate mining.
	We question the adequacy of the analysis which models only the impacts to the deep Floridan aquifer (FAS) impacts. Groundwater monitoring well data are available for the surficial aquifer, Peace River aquifer, upper/lower Arcadia aquifer and Hawthorn group and these need to be addressed.	The groundwater analyses in Chapter 4 of the Final AEIS have been expanded to include potential impacts to the surficial aquifer and the two levels of the intermediate aquifer.
	Pages 3-59 and 3-60 lists a number of way that phosphate mining can impact the Surficial Aquifer System, including extensive earthwork, dewatering and changed surficial soils, including addition of clay. The section states that the issue is addressed in Chapter 4. However, no analysis of the alternatives relative to these issues is presented in Chapter 4. The DAEIS is internally inconsistent when analyses are promised and not provided. The DAEIS needs to address and analyze Surficial Aquifer System (SAS) impacts of the alternatives.	The groundwater analyses in Chapter 4 of the Final AEIS have been expanded to include potential impacts to the surficial aquifer.
	Analysis relative to the Intermediate Aquifer System (IAS) water levels is limited to Page 3-60 and concludes that "within the Polk County area (the IAS) provide conveyance routes between the SAS and the FAS but such features are less frequently encountered to the south within the Peace River watershed." In the proposed area of mining impact wells are permitted to use the IAS. An analysis of impacts of alternatives to the IAS needs to be conducted.	The groundwater analyses in Chapter 4 of the Final AEIS have been expanded to include potential impacts to the two levels of the intermediate aquifer.
	Tables 4-69 and 4-70 (page 4-227 through 4-230) do not cite maximum drawdown and maximum increase modeled for the alternatives. The tables should include modeled maximum drawdown or increase. In addition, the tables should be ordered so the wells that are most relevant to the analysis are listed first (Upper Peace, SWIMAL, then Ridge Lakes).	Chapter 4 and Appendix F of the Final AEIS describe the potential direct, indirect, and cumulative impacts to the surficial, two levels of the intermediate, and Floridan aquifers.
	Existing wells are not identified in the DAEIS. Water levels and cones of depression (or increase) for each alternative should be compared with the depths of existing permitted wells that intersect those cones of effect. Potentially impacted permitted well should be identified and enumerated for each alternatives.	The potential impacts associated with phosphate mining are described in Chapter 4 and Appendix F of the Final AEIS.

	<p>Given that the capture analysis for other alternative mines demonstrates changes, reclamation of existing lands mined and not yet reclaimed (page 4-191) suggests that between 2000 and 2028, acreage of all past and present mines (25,000 acres) will be reclaimed. Given better flows after reclamation is complete within alternatives analysis (e.g. Figure 4-40 on page 4-91), it is reasonable to assume greater flows once capture areas are reclaimed in past and present mines.</p> <p>CHNEP requests that the "No Action" alternative be assessed with reclamation introduced as shown by 2028.</p>	<p>The surface water resource analysis in the Final AEIS does consider the effects of reclamation on runoff in the No Action Alternative.</p>
	<p>There are questions regarding the adequacy of projected river flows analysis for the alternatives.</p> <p>Each alternative is assessed separately. The "No Action" changes, as described in the preceding paragraph, should be introduced to the "No Mining" comparison for figures 4-37, 4-38, 4-40, 4-41, 4-43,4-45,4-46, 4-48, 4-50, and 4-51 (pages 4-88 through 4-102.) The Capture area graphs (Figures 4-36, 4-39, 4-42, 4-44, 4-47 and 4-49) that display cumulative capture areas for the alternatives should be utilized to assist in the cumulative analysis. The cumulative analysis for the alternatives within the Peace River basin should be assessed related to surface water flows at the confluence of the Peace River and Horse Creek.</p>	<p>The Final AEIS describes the potential direct and indirect effects of a No Action Alternative (as required by NEPA), the four Applicants' Preferred Alternatives (as required by NEPA and the Corps' NEPA implementing regulations), and four Offsite Alternatives, on surface water resources, individually. The Final AEIS also describes the potential cumulative effects of past, present, and reasonably foreseeable actions, including phosphate mining.</p>
	<p>It is inadequate and inaccurate to only provide an alternatives analysis using average annual rainfall conditions considering average annual flows. Average rainfall conditions and average flow conditions within the year represent a rare condition when ecological resources are under the least amount of stress. The alternatives should assess the cumulative impacts of mines on Peace River, Horse Creek and Big Slough utilizing the 2003 and 2007 hydrographs, when conditions were at more extreme within the period of record (see Figure 4-32 on page 4-83 and Figure 4-33 on page 4-84).</p>	<p>The surface water resource analyses in the Final AEIS have been updated to consider average and low rainfall conditions, and to present dry and wet season predicted flows.</p>
	<p>Discussion regarding "Cumulative Impacts to MFLs or MFL Target Water Levels" begins on page 4-220. However, this analysis is limited to Minimum Aquifer Levels (MALs) and does not address the MFLs as outlined in table 3-5 on page 3-49. The Lower Peace River MFL includes a 625 cfs maximum diversion and a low flow threshold of 90cfs. A draft rule is available for the Lower Myakka River and is expected to be submitted to the Southwest Florida Water Management District Governing Board by August. The alternatives should be assessed for the Lower Peace MFLs in a consistent fashion as was assessed for the MALs. The 2003 hydrograph, the median hydrograph, and 2007 hydrograph should be used to assess potential withdrawal impacts by block and for any change to the 90 cfs threshold period. All alternatives need to be quantitatively assessed for MFL.</p>	<p>The potential cumulative impact of phosphate mining on the MFLs for the lower Peace River are discussed in Chapter 4 of the Final AEIS.</p>

	<p>We question the adequacy of alternatives analysis related to Lower Peace River and Charlotte Harbor salinities. Page 3-45 states that "the AEIS evaluations will ... need to address the potential influence of phosphate mines on river flows in relation to whether any such influences would be of sufficient magnitude to result in ecologically meaningful changes in salinity regimes." No analyses related to effects on salinity in the Lower Peace or Charlotte Harbor are offered. On page 4-238, one paragraph is offered stating "The net effects of the four proposed new mine projects are not predicted to cause significant cumulative effects on downstream flow regimes and are not likely to impact Peace and Myakka River discharge volumes sufficiently to impact salinity regimes in the tidal portions of these rivers leading to Charlotte Harbor Estuary." This statement has no quantitative basis in fact presented in the DAEIS. The mines are assessed separately and not cumulatively.</p> <p>Peace River volume changes are shown at the Arcadia gauge, upstream of most of the "Proposed" and "Foreseeable" mine alternatives. The DAEIS assessment should include changes in salinity, especially the isohalines associated with the oligohaline (0.5 to 5 parts per thousand) and in the context of predicted sea level rise.</p>	<p>The Final AEIS describes the potential direct, indirect and cumulative effects of phosphate mining on the estuarine portions of the Myakka and Peace Rivers and on Charlotte Harbor. The analyses described in Chapter 4 and in Appendix G predict a net increase in flows to Charlotte Harbor.</p>
	<p>Chapter 3 (page 3-85) offer links to impairments lists rather than providing them as tables. The first link goes to an EPA search engine. The second link goes to a list of adopted Total Maximum Daily Loads (TMDLs) in Florida. Neither link provides information related to verified impairments in the Peace and Myakka River basins. Impairments within and downstream of the mine alternatives include: Chlorophyll a, dissolved oxygen, fecal coliform, total coliform, iron and mercury. The DEIS should acknowledge existing water quality impairments and potential (numeric nutrient) impairments in the study area and downstream.</p>	<p>Existing water quality conditions are discussed in Chapter 3 of the Final AEIS. Potential impairments associated with numeric nutrient criteria are discussed in Chapters 3 and 4, and Appendix D, as coordinated with EPA water quality staff. Potential water quality impacts are described in Chapter 4.</p>
	<p>Table 4-19 on page 4-109 does not include the Class III Chlorophyll-a criteria. In addition, the table includes only mean values. Table 4-19 should include chlorophyll-a standards and proposed numeric nutrient standards (as identified on page 3-92). The minimums, maximums, and standard deviations should be included in Table 4-19. Pollutant and hydrologic loads and estimated changes in concentrations for each alternative should be presented and analyzed.</p>	<p>Existing water quality conditions are discussed in Chapter 3 of the Final AEIS. Potential impairments associated with numeric nutrient criteria are discussed in Chapters 3 and 4, and Appendix D, as coordinated with EPA water quality staff. Potential water quality impacts are described in Chapter 4.</p>

	<p>The environmental justice (EJ) review screening techniques focus on block group populations of over 50% minority or 20% within poverty intersecting site alternative boundaries. Though that technique is suitable for infrastructure such as roadways to identify potentially affected communities, the impacts of phosphate mining can be as much from changes in employment opportunities as physical proximity. How will hiring practices change as alternative sets move from agriculture to phosphate mining, especially for the working poor? The analysis should include numbers of jobs and education requirements for agriculture versus phosphate production for the entire process including extraction, processing and transport for the mines.</p> <p>SWFRPC requests that EJ analysis be broadened to address health concerns (including air quality particulate, well water quality, noise, and night lighting) and employment of working poor.</p>	<p>Chapter 3 of the Final AEIS has been updated to explain how populations at risk were identified. Chapter 4 of the Final AEIS has been updated to explain the potential effects of the four proposed actions and their alternatives on identified populations. Additional information about public health and economic effects are also in Chapter 4.</p>
	<p>The DAEIS devotes eight lines to the climate and sea level rise. The SWFRPC and CHNEP have completed extensive review of climate change vulnerabilities for the project area that can be found at www.chnep.org/CRE.html and http://www.swfrpc.org/climate_change.html.</p> <p>The DAEIS study area of central and south Florida is currently experiencing climate change. The natural setting of southwest Florida coupled with extensive overinvestment in the areas most vulnerable to the effects of climate change have placed the region at the forefront of geographic areas that are among the first to suffer the negative effects of a changing climate. Climate change is an important social, economic, and community health issue facing our nation and Florida. It is not solely an environmental or scientific issue. The questions and answers surrounding climate change take root in economic, physical, and social structures. The SWFRPC has a two-decade history of addressing climate issues, beginning with its ground-breaking disaster and severe storm preparedness planning. Economic, social, community health, infrastructure and environmental issues have been addressed in the context of storm surge, wind speeds, and infrastructure resilience.</p>	<p>Comment acknowledged</p>

	<p>Climate change drivers include air temperature, air chemistry, water temperature and water chemistry. Climate change stressors include changes to rainfall, storm severity, humidity, drought, wildfires, hydrology, salt water intrusion, sea level rise and geomorphic changes. Changes in many of the drivers and stressors of climate change have been measured within and downstream of the CFPD. These include average air temperature, days per year over 90 degrees F, rainfall delivered in the rainy season sea level rise and evapo-transpiration. Much of the DAEIS analysis relates to these changing conditions that will be exacerbated by climate change factors. However, past conditions are applied throughout the analysis. Section 4.11.6 is the opportunity to suggest changing condition adjustments to consideration of alternatives.</p> <p>For example, over the past 100 years, 6 percent of annual rainfall has moved from the dry season to the rainy season, creating wetter rainy seasons and drier dry seasons. Drops in river flow contributions exacerbate the effects of sea level rise by increasing salinities, moving aquatic species up the system. This may put the DeSoto County bulrush marshes and Peace River/Manasota Water Supply Authority intake at risk.</p> <p>SWFRPC requests a methodical assessment of how each driver and stressor is exacerbated or ameliorated by the phosphate mining and processing alternatives.</p>	<p>Chapter 4 of the Final AEIS describes the potential effect of phosphate mining on climate change.</p>
	<p>Chapter 5: Mitigation of the DAEIS is inadequate and incomplete. Chapter 5 should include a presentation of avoidance and minimization techniques for all of the alternatives. This would include protecting existing stream riparian systems and restoring stream courses ditched for agriculture. The wide array of avoidance and minimization techniques employed through modern phosphate mining permits and through best management practices should be presented in detail, by each of the primary issues of concern identified in the executive summary, page 3.</p> <p>The mitigation for the alternatives should follow the federal sequencing of Avoidance, Minimization, Adaptation, and then Mitigation (AMMA). Going directly to mitigation short circuits principles of good project design and proper conservation stewardship.</p>	<p>Chapter 5 of the Final AEIS has been updated to better explain how the applicants will be required to avoid, minimize, and compensate for impacts in accordance with the 404(b)(1) Guidelines and the 2008 Compensatory Mitigation Rule. A mitigation framework for prioritization of certain types of waters of the United States is also discussed in Chapter 5. Examples of recent permit conditions that address mitigation success and adaptive management are provided in Chapter 5 and in Appendix I.</p>

Appendix B:
Spanish-language Translation of
Executive Summary

RESUMEN EJECUTIVO

RESUMEN EJECUTIVO

RE.1 ANTECEDENTES

En 2010 y 2011, el Cuerpo de Ingenieros del Ejército de los Estados Unidos, Distrito de Jacksonville (USACE, por sus siglas en inglés) recibió solicitudes de permisos del Departamento del Ejército bajo la Sección 404 de la Ley de Aguas Limpias (CWA, por sus siglas en inglés) de dos compañías mineras de fosfatos localizadas en el centro y suroeste de la Florida: Mosaic Fertilizer LLC (Mosaic) y CF Industries, Inc. (CF Industries), en adelante referidas como “los Solicitantes”. Las acciones propuestas incluyen la creación de nuevas minas de fosfato, expansión de minas existentes y la construcción de instalaciones de asistencia. Según propuestas, estas acciones resultarían en la descarga de relleno en aguas de los Estados Unidos.

Las autorizaciones federales para la aprobación de los permisos solicitados constituirían una Acción Federal Mayor (“Major Federal Action”). Como resultado, el USACE determinó que, vistos en conjunto, los proyectos de minería de fosfatos propuestos de forma independiente tienen similitudes que proveen una base para la evaluación de sus impactos ambientales directos, indirectos y acumulativos en una sola Declaración de Impacto Ambiental de Área Amplia (“Areawide Environmental Impact Statement” o AEIS, por sus siglas en inglés). Esta AEIS Final (y el Borrador AEIS en el cual la misma está basada) evalúa los impactos ambientales y económicos de las cuatro minas propuestas por los Solicitantes (Alternativa Preferida de los Solicitantes), así como los impactos asociados con la alternativa de No Acción y otras alternativas razonables previsibles en el Distrito Central de Fosfato de Florida (CFPD, por sus siglas en inglés).

En cumplimiento con la Ley Nacional de Política Ambiental (NEPA, por sus siglas en inglés) este AEIS Final sustentará la toma de decisión sobre las aplicaciones de permisos existentes e informará a las agencias, otras partes interesadas y el público sobre los impactos de, y alternativas para, las cuatro aplicaciones de permisos de minas de fosfatos similares de los Solicitantes. Esta AEIS Final será utilizada por el USACE para determinar si emite los permisos bajo la Sección 404 del CWA, los emite con modificaciones o condiciones o los deniega en respuesta a las cuatro aplicaciones de permisos similares. Como beneficio secundario, este AEIS Final proveerá información para sustentar la evaluación de posibles futuras aplicaciones para actividades adicionales de minería de fosfatos.

Según indicado en el proceso de alcance (“scoping”) y en el AEIS Borrador, el USACE llevará a cabo la revisiones de interés público y análisis bajo Sección 404(b)(1) para las cuatro solicitudes de permisos

similares en el acta de decisión y declaración de hallazgos (“record of decision statements of findings” [RODSOF]) para el proyecto-específico.

RE.2 PROPOSITO Y NECESIDAD DEL PROYECTO

En cumplimiento con NEPA, una Declaración de Impacto Ambiental (EIS, por sus siglas en inglés) “deberá especificar brevemente el propósito principal y la necesidad para la cual la agencia está respondiendo” (Título 40 del Código de Regulaciones Federales [CFR, por sus siglas en inglés] Parte 1502.13). Cuando se considera conjuntamente, el “propósito” y la “necesidad” de un proyecto propuesto (en este caso, la Alternativa Preferida de los Solicitantes) establecer los parámetros básicos para identificar la gama de alternativas as ser consideradas en un EIS.

De conformidad con el 33 CFR Parte 325, Apéndice B, al definir el propósito y la necesidad de un proyecto “mientras que por lo general se centra en la declaración del solicitante, el USACE en todos los casos ejercerá juicio independiente en definir el propósito y la necesidad del proyecto tanto desde el la perspectiva del solicitante y del público. Como parte de definir el propósito y necesidad del proyecto, el USACE define el Propósito Básico del Proyecto (“Basic Project Purpose”) y el Propósito Total del Proyecto (“Overall Project Purpose”). El objetivo básico del proyecto según definido por el USACE es extraer o minar mineral de fosfato. En general, la extracción de mineral de fosfato no requiere el acceso o la proximidad a un sitio acuático especial (“special aquatic site”). Por lo tanto, el USACE encuentra que el objetivo básico del proyecto no es dependiente del agua.

Para llevar a cabo la evaluación de las Alternativas Preferidas por los Solicitantes, no sólo con fines de NEPA y este AEIS, sino también para la evaluación del USACE asociada con las aplicaciones de permisos correspondientes bajo la Sección 404 del CWA y en conformidad con las Guías de Sección 404 (b) (1) (40 CFR Parte 230) y la revisión de interés público, el propósito y la necesidad se expresan en términos del propósito de la totalidad del proyecto. El propósito total del proyecto, definido independientemente según requerido por el USACE, constituye la base para la evaluación del USACE de alternativas razonables bajo NEPA. Por lo tanto, para este AEIS, el propósito del proyecto es extraer el mineral de fosfato de las reservas minerales en el CFPD y construir la infraestructura necesaria para extraer y procesar el mineral de fosfato en instalaciones de separación/beneficio, reconociendo que el mineral extraído debe estar dentro una distancia factible de una nueva o ya existente planta de beneficio.

Además del propósito y necesidad del USACE, los Solicitantes desarrollaron su propósito y necesidad, las cuales sirvieron como base para el análisis de alternativas.

RE.3 ALCANCE DEL AEIS

RE.3.1 Acción Propuesta

Los proyectos específicos propuestos por CF Industries y Mosaic que están siendo revisados por el USACE y sus números de solicitud de permisos del Departamento del Ejército, son Mina de Desoto ("Desoto Mine") de Mosaic (SAJ-2011-01968), Mina Ona ("Ona Mine") de Mosaic (SAJ-2011-01869), "Wingate East Mine" de Mosaic (SAJ-2009-03221), y Extensión Mina de Pastos Sur ("South Pasture Extension Mine") de CF Industries (SAJ-1993-01395). Los cuatro proyectos están propuestos en el área comúnmente conocida como el CFPD, un área de aproximadamente 1.32 millones de acres (o +/- 2,100 millas cuadradas) en los condados de Hardee, Hillsborough, Manatee, Polk, y DeSoto. Además hay cerca de 1,000 acres del CFPD en el condado de Sarasota; sin embargo, no ocurre minería, o se propone minería por los Solicitantes en el condado de Sarasota. Figura RE-1 muestra la localización del CFPD y los cuatro proyectos de minas de fosfato propuestos al igual que las zonas donde históricamente y actualmente a ocurrido minería en el CFPD.

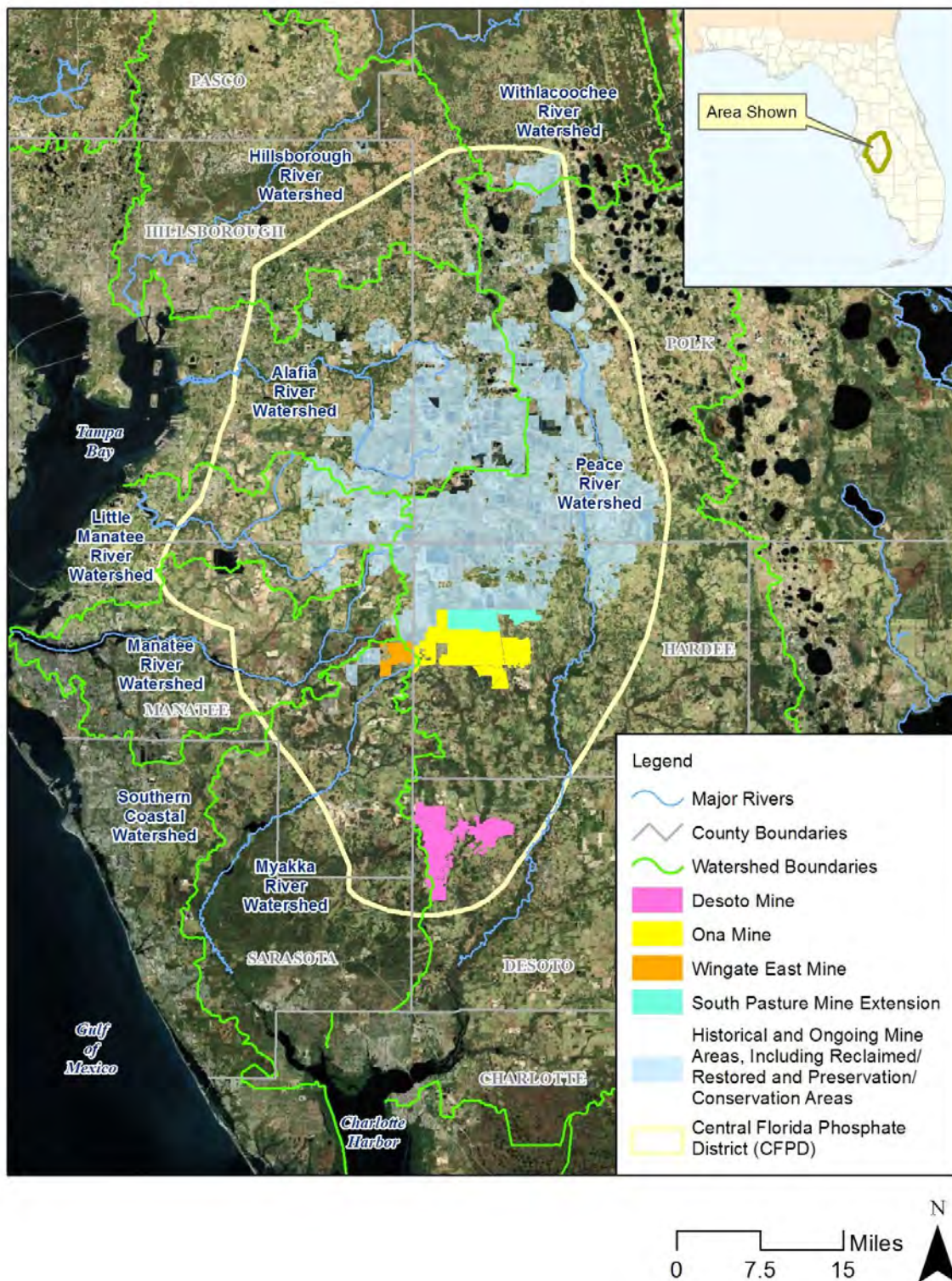


Figura RE-1. Localización de las Cuatro Nuevas Minas de Fosfato Propuestas por los Solicitantes en el Distrito Central de Fosfato de Florida

Las descripciones de la extensión jurisdiccional de humedales y riachuelos del USACE, y de los impactos propuestos a humedales y riachuelos bajo la jurisdicción del USACE, están basadas en determinaciones jurisdiccionales aprobadas y propuestas aprobadas. Los impactos propuestos reflejan las Alternativas Preferidas de los Solicitantes, así descritas en los avisos públicos del 1 de junio de 2012, para los cuatro proyectos, lo cual pudiera cambiar durante la revisión adicional del USACE para las cuatro solicitudes:

- **Desoto Mine (Mina Desoto).** Una nueva mina de fosfato de 18,287 acres basada en dragalinas (“dragline”) en el noroeste del Condado Desoto en la cuenca del Peace River. Se minaría durante aproximadamente 16 años, lo que se estima serían desde el 2021 hasta el 2037, con actividades de reclamación continuando hasta unos 6 años adicionales. El proyecto, así descrito en el aviso publico del 1 de junio de 2012, impactaría 3,253 acres de un total de 4,034 acres de humedales y aproximadamente 64,474 pies lineares de 128,639 pies de riachuelos que cumplen con el criterio de Aguas de los Estados Unidos.
- **Ona Mine (Mina Ona).** Una nueva mina de fosfato de 22,320 acres basada en dragalinas (“dragline”) en el oeste del Condado Hardee, mayormente ubicada en la cuenca del Peace River, con una pequeña porción en la cuenca del Myakka River. Se minaría durante aproximadamente 30 años, lo que se estima sería desde el 2020 hasta el 2050, con actividades de reclamación a continuar hasta unos 15 años adicionales. En general, hay 5,389 acres de humedales jurisdiccionales del USACE y 208,366 pies lineares de riachuelos jurisdiccionales del USACE en el sitio. El proyecto, según descrito en el aviso público del 1 de junio de 2012, impactaría 4,615 acres de un total de 5,389 acres de humedales y aproximadamente 136,731 pies lineares de riachuelos de 208,366 pies lineares de riachuelos que cumplen con el criterio de Aguas de los Estados Unidos.
- **Wingate East Mine (Mina Wingate del Este).** Una extensión de 3,635 acres basada en dragalinas (“dragline”) de la existente y permitida Mina Wingate Creek en el este del Condado de Manatee, mayormente en la cuenca del Myakka River, con una pequeña porción en la cuenca del Peace River. Se minaría durante aproximadamente 27 años, lo que se estima sería desde el 2019 hasta el 2046, con actividades de reclamación a continuar hasta unos 8 años adicionales. En general, hay 940 acres de humedales jurisdiccionales del USACE y 68,138 pies lineares de riachuelos jurisdiccionales del USACE en este sitio. El proyecto, según descrito en el aviso público del 1 de junio de 2012, impactaría 784 acres de pantanos y aproximadamente 27,287 pies lineares de riachuelos que cumplen con el criterio de Aguas de los Estados Unidos.

- **South Pasture Extension Mine (Extensión Mina de Pastos del Sur)**. Una extensión de 7,513 acres basada en dragalinas (“dragline”) de la existente y permitida Mina South Pasture en el Condado de Hardee en la cuenca del Peace River. Se minaría durante aproximadamente 13 años, lo que se estima sería desde el 2020 hasta el 2033, con actividades de reclamación a continuar hasta unos 10 años adicionales. En general, hay 1,699 acres de humedales jurisdiccionales del USACE y 92,809 pies lineares de riachuelos jurisdiccionales del USACE en este sitio. El proyecto, según descrito en el aviso público del 1 de junio de 2012, impactaría 1,218 acres de humedales y 32,161 pies lineares de riachuelos que cumplen con el criterio de Aguas de los Estados Unidos.

Para este AEIS, parcelas que existen entre (“infill parcels”) no son consideradas como acciones similares a las cuatro minas propuestas, ya que no comparten alternativas y periodos de tiempo similares con las minas propuestas. También, estas no llegan al nivel de significación de las acciones propuestas, y resultarían en niveles mucho más bajos de impacto. Estas parcelas son típicamente adquiridas y minadas por su proximidad a una mina existente o una mina y planta de beneficiación planificada para el futuro, y por otros factores, tal como si el dueño de la mina puede obtener el interés necesario de la propiedad. El USACE hará determinaciones proyecto-específicas bajo NEPA y otras autoridades aplicables en estas acciones separado a este AEIS Final.

El USACE más aún, ha determinado que las cuatro minas de fosfato propuestas por los Solicitantes tienen utilidad independiente de las plantas de fertilizantes existentes y que las operaciones de minería son proyectos independientes y completos. Fosfoyeso (“Phosphogypsum”, sulfato de calcio dihidratado) es un subproducto del proceso que convierte la roca de fosfato minado en compuestos usados en fertilizantes. El fosfoyeso, separado del ácido fosfórico, es en la forma de una mezcla sólida/agua (acuosa), que se almacena en áreas al aire libre conocidas como pilas (“stacks”) o pilas de yeso (“gybstacks”). Las industrias de Mosaic y CF han indicado que las plantas procesadoras de minerales (facilidades de producción de fertilizantes/fosfatos de grado alimenticio) conceptualmente podrían continuar sus operaciones independientemente de las minas propuestas, porque las plantas procesadoras de minerales no son necesariamente dependientes de las minas. Por lo tanto, las plantas de fertilizantes y las pilas de fosfoyeso no están dentro del alcance de la Acción Propuesta (Alternativa Preferida de los Solicitantes) y no están consideradas como un componente de los efectos directos e indirectos de las cuatro minas propuestas. Aunque no están incluidas como parte de la Acción Propuesta, están incluidas en el alcance del análisis de impactos acumulativos.

RE.3.2 Alcance del Análisis e Impactos

Al definir el alcance de análisis para el AEIS, el USACE consideró la gama de acciones, alternativas, e impactos a ser incluidos de acuerdo con el 40 CFR 1508.25. Basado en el proceso de alcance (“scoping”) y comentarios al Borrador del AEIS, este AEIS Final describe los impactos significativos, directos e indirectos, que se esperan ocurran como resultado de implementar la Alternativa de No Acción, las Alternativas Preferidas por los Solicitantes, y Alternativas Fuera del Sitio (“Offsite”) (según descritas en la Sección RE.5), y los impactos acumulativos resultantes de acciones pasadas, presentes, y razonablemente previsibles en el futuro, incluyendo ambas acciones de minar y no-minar. El USACE ha determinado que dos de las cuatro áreas deben ser identificadas como sitios con un potencial futuro para ser minados—el Tramo “Pine Level/Keys” (Sitio KK) y el Tramo “Pioneer” (Sitio LL), los cuales en el AEIS están identificado en un sin número de ocasiones como “West Pioneer”. Mosaic ha identificado estas áreas como minas a ser propuestas en el futuro y ha solicitado una determinación jurisdiccional para una porción del Tramo “Pine Level/Keys”. Debido a que los Tramos Pine Level/Keys y Pioneer son razonablemente previsibles en el futuro, han sido incluidos en el análisis de impactos acumulativos.

Aunque las dos propuestas de parcelas que existen entre (“infill parcels”) (G&D Farms and Lambe Tract) no son evaluadas como alternativas discretas, su contribución a los impactos acumulativos potenciales está considerada como parte de los efectos del análisis acumulativo en el Capítulo 4. Finalmente, este AEIS Final tomó en cuenta los impactos de las pilas de fosfoyeso – así como también otras acciones pasadas, presentes, y razonablemente previsibles en adición a las Alternativas Preferidas por los Solicitantes – en determinar los impactos acumulativos de la Acción Propuesta y otras acciones razonablemente previsibles.

RE.4 COMENTARIOS DEL PUBLICO Y AREAS DE CONTROVERSIA

RE.4.1 Comentarios del Público

Este AEIS Final es una revisión del Borrador AEIS, publicado el 1 de junio de 2012. Las revisiones incorporadas en este AEIS Final fueron realizadas en respuesta a los comentarios recibidos por el USACE al Borrador AEIS durante el periodo de comentarios, el cual terminó el 30 de julio de 2012. Los comentarios fueron sometidos de varias formas, incluyendo por escrito, por correo electrónico, posteados en una forma web, y por transcripciones tomadas durante las reuniones públicas.

De los 1,667 comentarios individuales, el número más alto de comentarios estuvo relacionado con el cumplimiento con NEPA, agua superficial y recursos de agua, y recursos ecológicos. Preocupaciones relacionadas con el cumplimiento con NEPA primordialmente fueron dirigidos hacia el propósito y necesidad, cumplimiento con reglamentos ambientales, y alcance del Borrador AEIS. Los asuntos de recursos de agua primordialmente se dirigieron hacia los métodos de evaluación del AEIS, cantidad y

calidad del agua, la interrelación entre aguas subterráneas y aguas superficiales, impactos potenciales al suministro de aguas públicas, y los efectos río abajo. Asuntos específicos de aguas subterráneas incluyeron solicitud para ampliar los modelos para evaluar impactos al sistema superficial de acuíferos, efectos graduales y acumulativos en acuíferos regionales, y el potencial para la intrusión de agua salada. Los comentarios relacionados con los recursos ecológicos se dirigieron a los impactos potenciales, métodos de evaluación, el valor potencial económico de los recursos, efectos potenciales a especies protegidas, y necesidad de mitigación.

Otros tópicos de recursos que recibiendo 200 comentarios o más incluyeron aguas subterráneas, impactos acumulativos, y económicos. También hubo una cantidad de comentarios individuales relacionados al proceso regulatorio, el proceso de desarrollo de alternativas, mitigación, y la extracción/descarga permitidas.

Después de que los comentarios fueron revisados y las respuestas fueron desarrolladas, varias áreas fueron identificadas que requirieron análisis adicional para apoyar este AEIS Final. Estas incluyeron el análisis de Alternativas Fuera del Sitio (“Offsite”); el análisis de Alternativas en el Sitio (“Onsite”) (el cual está discutido en este AEIS Final como un cuadro conceptual de mitigación); un reanálisis extensivo de los impactos relacionados a la extracción de aguas subterráneas durante los cambios de temporadas; análisis adicionales de los impactos a las aguas superficiales durante condiciones de temporada seca; y una evaluación en el análisis económico de planteamientos adicionales para considerar los efectos de ingresos tributarios.

RE.4.2 Áreas de Controversia

Basado en los comentarios del público provistos durante el proceso de alcance (“scoping”) y en el Borrador AEIS, el USACE identificó nueve categorías significativas de recursos para ser analizadas a profundidad para los efectos directos e indirectos en el AEIS Final:

- Recursos de Aguas Superficiales
- Recursos de Aguas Subterráneas
- Calidad de Agua
- Recursos Ecológicos (Comunidades Biológicas Acuáticas, Humedales, Habitáculos de Vida Silvestre, y Especies Listadas)
- Recursos Económicos
- Justicia Ambiental
- Radiación

- Recursos Culturales e Históricos
- Geología y Terrenos Superficiales

Los efectos directos e indirectos de las Alternativas de No Acción y Acción en estas categorías de recursos están resumidos en RE.6. En adición, el AEIS Final provee breves discusiones de las siguientes categorías las cuales, aunque de preocupación, fueron consideradas como no teniendo un efecto significativo y no requirieron evaluaciones detalladas.

- Calidad del Aire
- Ruido
- Clima y aumento en el nivel del mar
- Llanuras sujetas a Inundaciones
- Estética
- Transportación
- Recreación
- Manejo de Desperdicios
- Uso de Terreno

De acuerdo con las directrices del Consejo de Calidad Ambiental (CEQ, por sus siglas en inglés) (CEQ, 1997), el análisis de efectos acumulativos en el AEIS se enfocó en esas categorías de recursos que se determinaron ser significativas. Basado en la consideración de los efectos directos e indirectos de las acciones de minería actuales y razonablemente previsibles, los recursos, ecosistemas, y comunidades humanas que pudieran ser afectadas, y la importancia nacional, regional, y local de las categorías de recursos basado en comentarios recibidos durante el proceso de alcance (“scoping”) y el Borrador AEIS, el USACE determinó que las siguientes categorías de recursos tendrían un potencial efecto acumulativo significativo:

- Recursos de Agua Superficial
- Recursos de Agua Subterránea
- Calidad de Agua Superficial
- Recursos Ecológicos (Humedales/Aguas Superficiales y Habitáculos de Terreno Elevado)
- Recursos Económicos

Los efectos acumulativos de acciones pasadas, presentes, y razonablemente previsibles, incluyendo las actuales cuatro y dos acciones razonablemente previsibles de minar fosfato, en estas categorías de

recursos están resumidas en RE.6. El AEIS Final provee una breve explicación del porque otras categorías de recursos consideradas en detalle por sus efectos directos e indirectos no fueron determinadas como significativas para el análisis acumulativo de efectos.

RE.5 ALTERNATIVAS EVALUADAS

RE.5.1 Alternativa 1 – No Acción

Bajo la Alternativa de No Acción, la minería que ya ha sido autorizada en el CFPD continuaría según programada bajo los permisos actuales estatales y federales aprobados. Los permisos de CWA Sección 404 para las Alternativas Preferidas de los Solicitantes no serían emitidos por el USACE. Los Solicitantes tendrían la opción de solicitar minería en terrenos elevados o humedales que están confirmados no estar sujetos a la jurisdicción regulatoria del USACE bajo las leyes federales pertinentes. Sin embargo, para las evaluaciones bajo este AEIS, la asunción simple aplicada fue que la Alternativa de No Acción se refiere a que no mas proyectos de minería de la escala actualmente propuesta por los Solicitantes serian aprobados durante el horizonte de planificación analizado (hasta 2060).

RE.5.2 Alternativas 2 hasta 5: Alternativas Preferidas por los Solicitantes

Para este AEIS Final, el USACE definió las Alternativas Preferidas de los Solicitantes como la minería propuesta en las nuevas minas propuesta como descritas en las respectivas solicitudes de permisos y en la Sección RE-3.1:

- Alternativa 2 – Desoto Mine (o Mina Desoto)
- Alternativa 3 - Ona Mina (o Mina Ona)
- Alternativa 4 - Wingate East Mine (o Mina de Wingate Este)
- Alternativa 5 – South Pasture Extension Mine (o Extensión Mina Pastos del Sur)

RE.5.3 Alternativas 6 hasta 9: Alternativas Fuera del Sitio (“Offsite”)

Según requerido por las regulaciones del CEQ y el USACE, el USACE tiene que valorar y evaluar objetivamente todas las alternativas razonables, y para las alternativas que fueron eliminadas del estudio detallado, discutir brevemente las razones por las cuales fueron eliminadas. Estos reglamentos requieren que todas las alternativas razonables, factibles, prudentes, y prácticas que puedan cumplir con los objetivos de un proyecto propuesto sean identificadas y evaluadas.

En cumplimiento con estos requerimientos, el USACE independientemente identificó, revisó, y analizó alternativas que pudieran lograr el propósito y la necesidad del proyecto. Solo las alternativas

razonables fueron consideradas en detalle, como especificado en el 40 CFR Sección 1502.14(a), las cuales son aquellas alternativas que son viables en lograr el propósito fundamental y la necesidad que sería satisfecha por la acción federal propuesta (emitir el permiso).

El proceso para identificar las alternativas a ser consideradas en este AEIS, en adición a la Alternativa de No Acción y las Alternativas Preferidas por los Solicitantes, aplicó dos asumpciones generales (“overarching”):

1. Las alternativas tienen que estar localizadas sobre formaciones geológicas donde las reservas están localizadas en áreas económicamente explotables (“mineable”), lo cual limitó la evaluación del área dentro del CFPD.
2. Las alternativas tiene que estar dentro de una distancia práctica de una planta existente de beneficiación que podría procesar los materiales excavados a la mina alterna, o una nueva planta de beneficiación sería requerida como un elemento de la alternativa.

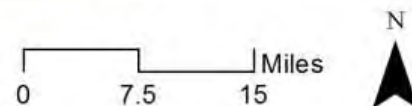
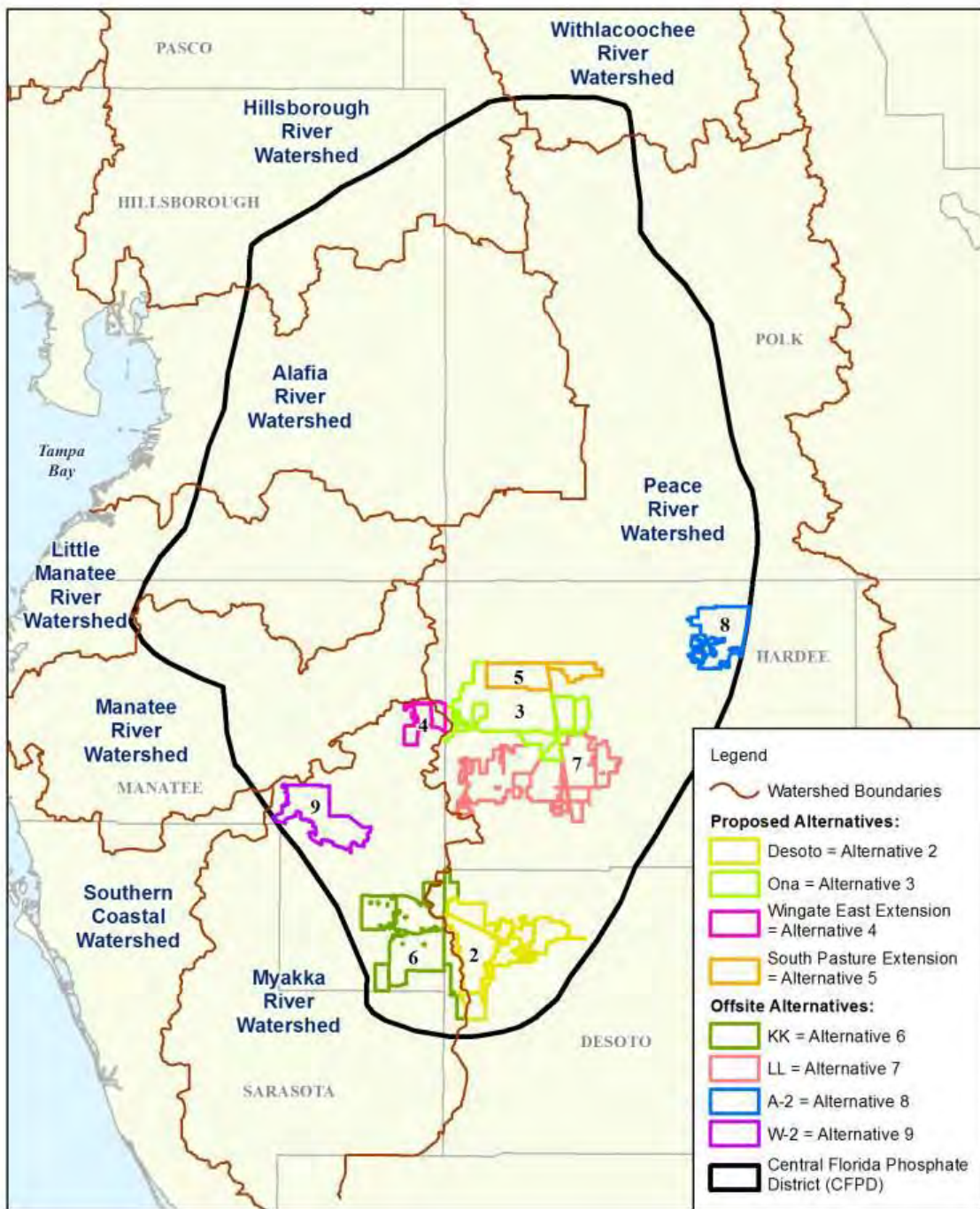
Este proceso resulto en las siguientes alternativas fuera del sitio (“offsite”):

- Alternativa 6 – Tramo “Pine Level/Keys”
 - El Tramo “Pine Level/Keys” está en los Condados de Manatee y DeSoto y primordialmente en la subcuenca de “Big Slough” y “Upper Myakka River” en la cuenca del “Myakka River” y una cantidad de acres mas pequeña en la subcuenca del Peace River. El área total de este sitio es 24,711 acres. Este sitio también ha sido considerado en el análisis de impactos acumulativos como una acción razonablemente previsible.
- Alternativa 7 – Tramo “Pioneer”
 - El Tramo “Pioneer” está en el Condado Hardee y la cuenca del Peace River. El area total del tramo es 25,259 acres. Este sitio también ha sido considerado en el análisis de impactos acumulativo como una acción razonablemente previsible.
- Alternativa 8 – Sitio A-2
 - Esta alternativa esta en el Condado de Hardee y en la cuenca del Peace River. El área total del tramo es 8,189 acres. Esta alternativa está en el tamaño mínimo considerado razonable para una mina individual; sin embargo, su proximidad a otras minas actuales o potenciales en el futuro, dado que ésta propiedad pudiese ser adquirida y la futura prospección indica

que era razonable desarrollar la mina, mejorar el potencial del sitio como una futura área satélite para otras minas.

- Alternativa 9 – Sitio W-2
 - Esta alternativa esta en el Condado de Manatee y en la cuenca del Myakka River. El área total del tramo es 9,719 acres. Esta alternativa está en el tamaño mínimo considerado razonable para una mina individual; sin embargo, su proximidad a otras minas actuales o potenciales en el futuro, dado que ésta propiedad pudiese ser adquirida y la futura prospección indicó que era razonable desarrollar la mina, lo cual mejora el potencial del sitio como una futura área satélite para otras minas.

Las Alternativas Preferidas por los Solicitantes y las Alternativas Fuera del Sitio se muestran en la Figura RE-2.



Fig

ura ES-2. Localización de las Alternativas Preferidas por los Solicitantes y Alternativas Fuera del Sitio (Offsite)

RE.5.4 Alternativas Funcionales

Otras alternativas potenciales a los métodos operacionales y de minería propuestos fueron propuestas durante el período del proceso de alcance (“scoping”) y en comentarios al Borrador del AEIS, incluyendo el uso de acercamientos que evitarían o minimizarían impactos a aguas de los Estados Unidos mediante cambios operacionales o tecnológicos o substitutos del proyecto. Estas alternativas incluyen el potencial de substituir métodos de dragado en lugar de excavación con dragalinas (“dragline”), reemplazando mineral de fosfato con otras alternativas de fertilización, o importando minerales de fosfato de afuera del CFPD. Se determinó que estas alternativas funcionales no cumplen con el propósito del proyecto, y por lo tanto no se continuó con su análisis adicional en el AEIS Final.

RE.5.5 Alternativas en el Sitio (“Onsite”)

Para este AEIS, el USACE desarrolló un marco de trabajo (“framework”) para delinear alternativas razonables para evitar, minimizar, y mitigar compensatoriamente las cuatro Alternativas Preferidas por los Solicitantes. El marco de trabajo de mitigación propuesto está basado en la secuencia de mitigación requerida bajo las Guías para Sección 404(b)(1) del CWA para mitigar impactos adversos potenciales a las aguas de los Estados Unidos, lo que primero requiere evitar el impacto, luego minimización y finalmente mitigación compensatoria para cualquier impacto inevitable (ver Sección 5.1.2). El marco de trabajo de mitigación identifica prioridades basadas en evitar impactos y alternativas de minimización identificadas como razonables bajo NEPA. El marco de trabajo de mitigación será aplicado después de la consideración de las presunciones aplicables para las descargas de relleno propuestas dentro de sitios acuáticos bajo las Guías de Sección 404(b)(1) – esto es, que un sitio alternativo que no es un sitio especial acuático existe y que tal sitio va a resultar en menos impactos ambientales adversos al ecosistema acuático a menos que el Solicitante lo demuestre claramente de otra manera. El marco de trabajo de mitigación propuesto no modifica ninguna ley o reglamento o autoridad jurisdiccional del USACE o cualquier otra agencia, y su intención es consistente con la Regla de Mitigación del 2008.

RE.6 RESUMEN DE EFECTOS

RE.6.1 Efectos Directos e Indirectos

La Tabla ES-1 resume los grados de los efectos directos e indirectos, sin o con mitigación, de la Alternativa de No Acción, las cuatro Alternativas Preferidas por los Solicitantes, y las cuatro Alternativas Fuera del Sitio (“Offsite”) en las categorías de recursos que fueron analizadas en profundidad para el AEIS Final. La Tabla ES-2 resume las determinaciones significantes, con o sin mitigación, para la Alternativa de No Acción, las cuatro Alternativas Preferidas por los Solicitantes y las cuatro Alternativas Fuera del Sitio (“Offsite”) para cada categoría de recurso analizado en profundidad.

Tabla RE-1. Grado del Efecto de las Alternativas de No Acción, Preferida por los Solicitantes y Fuera del Sitio

Categoría de Recursos	1: No Acción ^a		2: Mina Desoto		3: Mina Ona		4: Mina "Wingate" Este		5: Mina de Pastos Extensión Sur		6: Nivel de Pino/Tamo Llave		7: Tramo Pionero		8: Sitio A-2		9: Sitio W-2	
	No Minería	Solo Sobre terreno	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación
Recursos de Aguas Superficiales (Section 4.2)																		
Riachuelo Caballo	●	○	●	○	●	○	○	○	●	○	●	○	●	○	N/A	N/A	N/A	N/A
Río Paz en Arcadia	●	○	○	○	○	○	N/A	N/A	○	○	N/A	N/A	○	○	N/A	N/A	N/A	N/A
Riachuelo Payne	●	○	N/A	N/A	N/A	N/A	N/A	N/A	○	○	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Río Paz en los Manantiales de Zolfo	●	○	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	●	○	N/A	N/A
Río Myakka Superior	●	○	N/A	N/A	○	○	○	○	N/A	N/A	○	○	N/A	N/A	N/A	N/A	●	○
Inferior Myakka/Grande "Slough"	●	●	○	○	N/A	N/A	N/A	N/A	N/A	N/A	●	○	N/A	N/A	N/A	N/A	N/A	N/A
Río Paz	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Río Myakka	●	○	N/A	N/A	○	○	○	○	N/A	N/A	○	○	N/A	N/A	N/A	N/A	○	○

Tabla RE-1. Grado del Efecto de las Alternativas de No Acción, Preferida por los Solicitantes y Fuera del Sitio

Categoría de Recursos	1: No Acción ^a		2: Mina Desoto		3: Mina Ona		4: Mina "Wingate" Este		5: Mina de Pastos Extensión Sur		6: Nivel de Pino/Tamo Llave		7: Tramo Pionero		8: Sitio A-2		9: Sitio W-2	
	No Minería	Solo Sobre terreno	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación
Bahia de Charlotte	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Recursos de Aguas Subterráneas Incluyendo Abasto de Agua (Section 4.3)																		
Acuífero Superficial	● ^b	● ^b	N/A	○	N/A	○	N/A	○	N/A	○	N/A	○	N/A	○	N/A	○	N/A	○
Acuífero Intermedio Zona 1 y 2	● ^b	● ^b	N/A	○	N/A	○	N/A	○	N/A	○	N/A	○	N/A	○	N/A	○	N/A	○
Acuífero Floridiano Superior	● ^b	● ^b	N/A	○	N/A	○	N/A	○	N/A	○	N/A	○	N/A	○	N/A	○	N/A	○
Calidad de Agua (Section 4.4) ^c																		
Calidad de Agua Superficial	○	○	N/A ^e	●	N/A ^e	●	N/A ^e	●	N/A ^e	●	N/A ^e	●	N/A ^e	●	N/A ^e	●	N/A ^e	●
Calidad de Agua Subterránea	○	○	N/A ^e	●	N/A ^e	●	N/A ^e	●	N/A ^e	●	N/A ^e	●	N/A ^e	●	N/A ^e	●	N/A ^e	●

Tabla RE-1. Grado del Efecto de las Alternativas de No Acción, Preferida por los Solicitantes y Fuera del Sitio

Categoría de Recursos	1: No Acción ^a		2: Mina Desoto		3: Mina Ona		4: Mina "Wingate" Este		5: Mina de Pastos Extensión Sur		6: Nivel de Pino/Tamo Llave		7: Tramo Pionero		8: Sitio A-2		9: Sitio W-2	
	No Minería	Solo Sobre terreno	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación
Recursos Ecológicos (Section 4.5)																		
Comunidades Biológicas Acuáticas																		
Humedales																		
Habitáculos de Vida Silvestre																		
Especies Listadas (Amenazadas o en Peligro)																		
Recursos Económicos (Section 4.6)																		
Condado DeSoto		N/A ^d	^b	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Condado Hardee		N/A ^d	N/A	N/A	^b	N/A	N/A	N/A	^b	N/A	N/A	N/A	^b	N/A	^b	N/A	N/A	N/A
Condado Manatee		N/A ^d	N/A	N/A	N/A	N/A	^b	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	^b	N/A
Condados DeSoto y Manatee		N/A ^d	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	^b	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Tabla RE-1. Grado del Efecto de las Alternativas de No Acción, Preferida por los Solicitantes y Fuera del Sitio

Categoría de Recursos	1: No Acción ^a		2: Mina Desoto		3: Mina Ona		4: Mina "Wingate" Este		5: Mina de Pastos Extensión Sur		6: Nivel de Pino/Tamo Llave		7: Tramo Pionero		8: Sitio A-2		9: Sitio W-2	
	No Minería	Solo Sobre terreno	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación
Justicia Ambiental (Section 4.7)																		
Condado DeSoto	○	○	○	○	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Condado Hardee	●	N/A ^e	N/A	N/A	N/A ^e	○ _b	N/A	N/A	N/A ^d	○ _b	N/A	N/A	○	○	○	○	N/A	N/A
Condado Manatee	○	N/A ^e	N/A	N/A	N/A	N/A	N/A ^e	○ _b	N/A	N/A	○	○	N/A	N/A	N/A	N/A	○	○
Radiación (Section 4.8)	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Recursos Históricos y Culturales (Section 4.9)	○	●	●	○	●	○	●	○	●	○	●	○	●	○	●	●	●	●
Suelos y Geología Superficial (Section 4.10)	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Tabla RE-1. Grado del Efecto de las Alternativas de No Acción, Preferida por los Solicitantes y Fuera del Sitio

Categoría de Recursos	1: No Acción ^a		2: Mina Desoto		3: Mina Ona		4: Mina "Wingate" Este		5: Mina de Pastos Extensión Sur		6: Nivel de Pino/Tamo Llave		7: Tramo Pionero		8: Sitio A-2		9: Sitio W-2	
	No Minería	Solo Sobre terreno	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación
<p>Leyenda:</p> <p>+ Impacto Beneficioso</p> <p>○ Impacto menor o no impacto</p> <p>● Impacto moderado</p> <p>● Impacto Mayor</p> <p>N/A No Aplica</p> <p>Notas:</p> <p>Impactos asociados con la No Acción incluyen mitigación que puede haber sido incluida como parte de actividades existentes permitidas.</p> <p>^b Impactos son beneficiosos</p> <p>^c Los análisis de calidad de agua se llevaron a cabo "con mitigación"</p> <p>^d Los efectos económicos son comparados con la Alternativa de No Acción</p> <p>^e N/A significa que no aplica debido a que los datos son inadecuados para conducir análisis.</p>																		

Tabla RE-2. Significancia de la Determinación de las Alternativas de No Accion, Preferida por los Solicitantes, y Fuera del Sitio

Categoría de Recursos	1: No Acción ^a		2: Mina Desoto		3: Mina Ona		4: Mina "Wingate" Este		5: Mina de Pastos Extension Sur		6: Nivel de Pino/Tamo Llave		7: Tramo Pionero		8: Sitio A-2		9: Sitio W-2	
	No Minería	Solo Sobre terreno	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	No Minería	Solo Sobre terreno	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación
Recursos de Aguas Superficiales (Section 4.2)																		
Riachuelo Caballo	S	N	S	N	S	N	N	N	S	N	S	N	S	N	N/A	N/A	N/A	N/A
Río Paz en Arcadia	S	N	N	N	N	N	—	—	N	N	—	—	N	N	N/A	N/A	N/A	N/A
Riachuelo Payne	—	—	—	—	—	—	—	—	N	N	—	—	—	—	—	—	—	—
Río Paz en los Manantiales de Zolfo	S	N	—	—	—	—	—	—	—	—	—	—	—	—	S	N	—	—
Río Myakka Superior	S	N	—	—	N	N	N	N	—	—	N	N	—	—	—	—	S	N
Inferior Myakka/Grande "Slough"	S	N	N	N	—	—	—	—	—	—	S	N	—	—	—	—	—	—
Río Paz	S	N	N	N	N	N	—	—	N	N	N	N	N	N	N	N	—	—
Río Myakka	S	N	—	—	N	N	N	N	—	—	N	N	—	—	—	—	N	N

Tabla RE-2. Significancia de la Determinación de las Alternativas de No Acción, Preferida por los Solicitantes, y Fuera del Sitio

Categoría de Recursos	1: No Acción ^a		2: Mina Desoto		3: Mina Ona		4: Mina "Wingate" Este		5: Mina de Pastos Extensión Sur		6: Nivel de Pino/Tamo Llave		7: Tramo Pionero		8: Sitio A-2		9: Sitio W-2	
	No Minería	Solo Sobre terreno	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	No Minería	Solo Sobre terreno	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación
Bahia de Charlotte	S	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Recursos de Aguas Subterráneas Incluyendo Abasto de Agua (Section 4.3)																		
Acuífero Superficial	N	N	—	N	—	N	—	N	—	N	—	N	—	N	—	N	—	N
Acuífero Intermedio Zona 1 y 2	N	N	—	N	—	N	—	N	—	N	—	N	—	N	—	N	—	N
Acuífero Floridiano Superior	N	N	—	N	—	N	—	N	—	N	—	N	—	N	—	N	—	N
Calidad de Agua (Section 4.4) ^c																		
Calidad de Agua Superficial	N	N	—	N	—	N	—	N	—	N	—	N	—	N	—	N	—	N
Calidad de Agua Subterránea	N	N	—	N	—	N	—	N	—	N	—	N	—	N	—	N	—	N

Tabla RE-2. Significancia de la Determinación de las Alternativas de No Acción, Preferida por los Solicitantes, y Fuera del Sitio

Categoría de Recursos	1: No Acción ^a		2: Mina Desoto		3: Mina Ona		4: Mina "Wingate" Este		5: Mina de Pastos Extensión Sur		6: Nivel de Pino/Tamo Llave		7: Tramo Pionero		8: Sitio A-2		9: Sitio W-2	
	No Minería	Solo Sobre terreno	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	No Minería	Solo Sobre terreno	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación
Recursos Ecológicos (Section 4.5)																		
Comunidades Biológicas Acuáticas	N	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N
Humedales	N	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N
Habitáculos de Vida Silvestre	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N
Especies Listadas (Amenazadas o en Peligro)	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N
Recursos Económicos (Section 4.6)																		
Condado DeSoto	N	—	S	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condado Hardee	S	—	—	—	S	—	—	—	S	—	—	—	S	—	S	—	—	—
Condado Manatee	S	—	—	—	—	—	N	—	—	—	—	—	—	—	—	—	N	—
Condados DeSoto y Manatee	S	—	—	—	—	—	—	—	—	—	S	—	—	—	—	—	—	—

Tabla RE-2. Significancia de la Determinación de las Alternativas de No Acción, Preferida por los Solicitantes, y Fuera del Sitio

Categoría de Recursos	1: No Acción ^a		2: Mina Desoto		3: Mina Ona		4: Mina "Wingate" Este		5: Mina de Pastos Extensión Sur		6: Nivel de Pino/Tamo Llave		7: Tramo Pionero		8: Sitio A-2		9: Sitio W-2	
	No Minería	Solo Sobre terreno	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	No Minería	Solo Sobre terreno	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación	Con Mitigación	Sin Mitigación
Justicia Ambiental (Section 4.7)	S	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Condado DeSoto	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Condado Hardee	N	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N
Condado Manatee	N	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N
Leyenda: S = Significante N = No Significativa Note: Impactos asociados con la No Acción incluyen mitigación que puede haber sido incluida como parte de actividades existentes permitidas.																		

RE.6.2 Efectos Acumulativos

El análisis de impactos acumulativos consideró los efectos de las acciones actuales (Desoto, Ona, Wingate East, y South Pasture Extension) y razonablemente previsibles (Pine Level/Keys Tract and Pioneer Tract), junto con otras acciones pasadas, presentes y razonablemente previsibles, en las categorías de recursos determinadas como significativas.

Para recursos de aguas superficiales, el análisis de impactos acumulativos determinó que sin mitigación, las cuatro acciones actuales, acumulativamente con dos acciones razonablemente previsibles y con otras acciones pasadas, presentes, y razonablemente previsibles, tendrían un nivel de magnitud menor a moderado, lo cual no sería significativo para la mayoría de las subcuencas o cuencas afectadas. La primordial excepción es la subcuenca de “Horsecreek”, la cual tendría impactos acumulativos a un nivel de magnitud moderado, y sería significativo sin mitigación. Con mitigación, la magnitud de los efectos sería menor, lo cual no sería significativo para todas las subcuencas y cuencas en la región afectada.

Para recursos de agua subterráneas, no hubo base para evaluar los efectos potenciales directos e indirectos sin mitigación. Todos los datos disponibles están dentro de los requerimientos del SFWMD, que incluyen mitigación por extracción de agua subterránea, resultando en un análisis acumulativo de impactos basado en efectos con mitigación. El análisis acumulativo de impactos determinó que con mitigación, las cuatro acciones actuales, acumulativamente con las dos acciones razonablemente previsibles y con las acciones pasadas, presente, y razonablemente previsibles en el futuro tendrían un nivel de magnitud menor, el cual no sería significativo.

Para calidad de agua superficial, no hubo base para evaluar los efectos potenciales directos e indirectos sin mitigación ya que los datos disponibles están todos basados en mitigación requerida para mantenerse en cumplimiento con los estándares de calidad de agua, resultando en un análisis de impacto acumulativo basado en efectos con mitigación. El análisis de impactos acumulativos determinó que con mitigación, las cuatro acciones actuales, acumulativamente con dos acciones razonablemente previsibles y con otras acciones pasadas, presentes, y razonablemente previsibles en el futuro, tendrían un nivel de magnitud menor, el cual no sería significativo.

Para recursos ecológicos (humedales/aguas superficiales y hábitáculos sobre el terreno), el análisis de impactos acumulativos determinó que sin mitigación, las cuatro acciones actuales, acumulativamente con dos acciones razonablemente previsibles y con otras acciones pasadas, presentes, y razonablemente

previsibles en el futuro, tendrían un nivel de magnitud mayor, el cual sería significativo. Con mitigación, la magnitud de los efectos acumulativos sería menor, lo cual no sería significativo.

Para los recursos económicos, el análisis de impactos acumulativos determinó que las cuatro acciones actuales, acumulativamente con dos acciones razonablemente previsibles y con otras acciones pasadas, presentes, y razonablemente previsibles en el futuro, tendrían un nivel de magnitud de menor a mayor, el cual tendría beneficios significativos.

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**Appendix C:
Summary of Changes to Surface
Water Hydrology Analysis and
Replacement Pages for Chapter 4 and
Appendices G and J**

Appendix C:

Summary of Changes to Surface Water Hydrology Analysis

SURFACE WATER ANALYSIS ERRATA

June 21, 2013

During review of the Final AEIS an error was found in the spreadsheets related to the 50 percent capture scenarios for the three applicant mines: Desoto, Ona, and South Pasture Extension. These specific mines had an extra factor in the equation that resulted in additional reductions in the calculated contribution of runoff from these mines. In addition, the runoff values from the active mining areas for average rainfall conditions were included in the low rainfall estimate files. These values were corrected and the results were reevaluated.

SECTION 4.2

The two methods (runoff coefficient and excess precipitation [see Section 2.6.1 in Appendix G]) provided very similar results for average rainfall conditions, especially for the years of peak reduction. However, there was a small difference between the two methods (about 1 cfs or less). When the flows from the three active mines were added to estimate cumulative effects in Horse Creek, these small differences added up to be about 3 to 5 cfs. This difference, while small in absolute values, affected the percent change by a larger magnitude in the dry season. In addition, this difference in methods indicated that there was an impact from the mining before active mining occurred, which was simply an artifact of using different approaches. To be consistent between baseline condition predictions and future conditions and all current actions (including the foreseeable actions), the surface runoff was recomputed using only the runoff coefficient approach. The excess precipitation method was still useful, but only to verify the general accuracy of the runoff coefficient computation method.

Changes to Section 4.2 include:

- Replaced 12 tables: 4-12, 4-14, 4-16, 4-18, 4-20, 4-22, 4-24, 4-26, 4-32, 4-34, 4-36, and 4-38. These changed values are noted below.
- In addition to the tables, references to the values in the text were edited to reflect the new values.
- The conclusions for the individual mines did not change. The percent changes were reduced by about half for the low rainfall years.
- References to using different approaches to estimate runoff were eliminated by minor rewording and deletions.

SECTION 4.12.2

The error found in the spreadsheets related to the 50 percent capture scenarios for the three applicant mines described above was carried through in the cumulative analysis as these results were summed.

Changes to Section 4.12.2 include:

- Replaced 6 tables: 4-114, 4-116, 4-118, 4-120, 4-122, and 4-124. These changed values are noted below. In addition to the tables, references to the values in the text were edited to reflect the new values. No changes to the characterization of the cumulative impacts (minor or moderate) were required. The percent changes were reduced by about half for the low rainfall years.

APPENDIX G

- All tables listed above were derived from the results provided in Appendix G. Therefore, the same changes in the tables were required in Appendix G (corresponding Appendix G table numbers are noted below each Chapter 4 table that follows this text). In addition, two more tables in Appendix G were replaced: Table 85 and 87.
- Figures that were obviously shifted were replaced: 31, 33, 39, 41, 51, 91, 93, and 99.
- Figures 108 and 109 were replaced due to format differences compared to other charts.
- Section 2.6.1 was moved to the end of Section 2.5 and renumbered to be 2.5.2. Section 2.6 subsections were renumbered.
- There was some minor rewording or deletions to clarify that only the runoff coefficient method was used.

APPENDIX J

- References to using different approaches to estimate runoff were eliminated by minor rewording and deletions.

REPLACEMENT TABLES FOLLOW:

**Table 4-12. Projected Flows and Percent Change from 2009 Flows
during Average Rainfall Year and 50 Percent Capture
at the Horse Creek Flow Station with the Desoto Mine**

Year	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	171	0%	78	0%	404	0%
2020	173	1%	78 5	0 -4%	413	2%
2030	167 168	-2%	75 73	-3 -5%	401 403	-1 0%
2035	166 165	-3%	75 73	-4 -6%	399 397	-1 -2%
2040	169 169	-1%	76 74	-2 -5%	407	1%
2050	175 175	3 2%	79 75	2 -3%	422 420	4%
2060	177 176	3%	79 76	2%	424 423	5%

ERRATA NOTE: Same changes to values in Table 17 and replaced Figure 31 in Appendix G.

**Table 4-14. Projected Flows and Percent Change from 2009
Flows during Low Rainfall Year and 50 Percent Capture
at the Horse Creek Flow Station with the Desoto Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	84	0%	38	0%	199	0%
2020	85 84	1%	38 35	0 -7%	203 202	2%
2030	82	-2%	37 35	-3 -8%	197 197	-1%
2035	82 81	-3%	37 35	-4 -8%	196 195	-1 -2%
2040	83 83	-1%	37 35	-2 -7%	200	1%
2050	86	3 2%	39 36	2 -6%	207 206	4%
2060	87 86	3%	39 36	2 -5%	209 208	5 4%

Note: Variations in percentages with similar flow values is related to rounding nuances.

~~Desoto Mine Effects on Peace River at Arcadia~~

ERRATA NOTE: Same changes to values in Table 19 and replaced Figure 33 in Appendix G.

**Table 4-16. Projected Flows and Percent Change from 2009 Flows
during Average Rainfall Year and 50 Percent Capture
at the Peace River at Arcadia Flow Station with the Desoto Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	713	0%	328	0%	1,657	0%
2020	726	2%	332	1%	1,702	3%
2030	738	3%	336	2%	1,741	5%
2040	754 ⁵	6%	343	5%	1,785 ⁶	8%
2050	772	8%	351	7%	1,829	10%
2060	783	10%	355	8%	1,858	12%

ERRATA NOTE: Same changes to values in Table 21 in Appendix G. No figure change required.

**Table 4-18. Projected Flows and Percent Change from 2009 Flows
during Low Rainfall Year and 50 Percent Capture
at the Peace River at Arcadia Flow Station with the Desoto Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	330	0%	152	0%	766	0%
2020	337 ⁶	2%	154	1%	787	3%
2030	342	4%	156	3%	806	5%
2040	350	6%	159	5%	827	8%
2050	358	9%	163	7%	848	11%
2060	363	10%	165	9%	862	13%

ERRATA NOTE: Same changes to values in Table 23 in Appendix G. No figure change required.

**Table 4-20 Projected Flows and Percent Change from 2009 Flows
during Average Rainfall Year and 50 Percent Capture
at the Horse Creek Flow Station with the Ona Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	171	0%	78	0%	404	0%
2020	172 171	1% 0%	78 74	0% -4%	413 409	4 2%
2030	169 168	-1% -2%	76 73	-2% -5%	407 404	0 1%
2040	168 166	-1% -3%	76 72	-3% -7%	405 404	0% -1%
2045	168 168	-1% -2%	76 73	-2% -6%	405 404	0% 0%
2050	170 169	-1%	76 73	-2% -6%	408 404	1% 0%
2060	176 174	3% 2%	79 75	2% -3%	422 419	4%

ERRATA NOTE: Same changes to values in Table 25 and replaced Figure 39 in Appendix G.

**Table 4-22. Projected Flows and Percent Change from 2009 Flows
during Low Rainfall Year and 50 Percent Capture
at the Horse Creek Flow Station with the Ona Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	84	0%	38	0%	199	0%
2020	85	1%	38 35	0% -8%	203	2%
2030	83	-1 2%	37 35	-2% -9%	200 199	1% 0%
2040	83 2	-3 1%	37 35	-3% -9%	199 197	0% -1%
2045	83	-1%	37 35	-2% -8%	199 199	0%
2050	83	-1%	37 35	-2% -8%	201 199	1% 0%
2060	86	3 2%	39 36	2% -6%	208 207	4%

ERRATA NOTE: Same changes to values in Table 27 and replaced Figure 41 in Appendix G.

**Table 4-24. Projected Flows and Percent Change from 2009 Flows
during Average Rainfall Year and 50 Percent Capture
at the Peace River at Arcadia Flow Station with the Ona Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	713	0%	328	0%	1,657	0%
2020	726 724	2%	332 334	1%	1,702 1,697	3% 2%
2030	738 736	3 4%	336 335	2%	1,742 1,737	5% 5%
2040	753 752	6%	342 342	4%	1,783 1,779	8% 7%
2050	771 770	8%	350 350	7%	1,827 1,823	10%
2060	783 784	10%	355 354	8%	1,858 1,853	12%

ERRATA NOTE: Same changes to values in Table 29 in Appendix G. No figure change required.

**Table 4-26. Projected Flows and Percent Change from 2009 Flows
during Low Rainfall Year and 50 Percent Capture
at the Peace River at Arcadia Flow Station with the Ona Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	330	0%	152	0%	766	0%
2020	336 335	2% 2%	154 153	1%	787 785	3% 2%
2030	342 344	4% 3%	156 155	3% 2%	807 804	5%
2040	349 349	6% 6%	159 158	5% 4%	826 824	8%
2050	358 357	9% 8%	163 162	7%	848 845	11% 10%
2060	363 362	10%	165 164	9% 8%	862 859	13% 12%

ERRATA NOTE: Same changes to values in Table 31 in Appendix G. No figure change required.

**Table 4-32. Projected Flows and Percent Change from 2009 Flows
during Average Rainfall Year and 50 Percent Capture
at the Horse Creek Flow Station with the South Pasture Extension Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	171	0%	78	0%	404	0%
2020	<u>172</u> 469	<u>1</u> -4%	<u>78</u> 76	<u>0</u> -2%	<u>412</u> 404	<u>2</u> 0%
2030	<u>170</u> 468	<u>0</u> -2%	<u>76</u> 75	<u>-1</u> -3%	<u>409</u> 403	<u>1</u> 0%
2040	<u>174</u> 170	<u>2</u> 0%	<u>78</u> 77	<u>1</u> -4%	<u>418</u> 410	<u>3</u> 1%
2050	<u>175</u> 472	<u>3</u> 4%	<u>79</u> 77	<u>2</u> -4%	<u>422</u> 413	<u>4</u> 2%
2060	<u>177</u> 473	<u>3</u> 4%	<u>79</u> 78	<u>2</u> 0%	<u>424</u> 416	<u>5</u> 3%

ERRATA NOTE: Same changes to values in Table 37 in Appendix G. No figure change required.

**Table 4-34. Projected Flows and Percent Change from 2009 Flows
during Low Rainfall Year and 50 Percent Capture
at the Horse Creek Flow Station with the South Pasture Extension Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	84	0%	38	0%	199	0%
2020	85 <u>4</u>	1%	38	<u>0</u> -4%	202	2%
2030	84 <u>3</u>	0%- <u>1</u> %	38 <u>7</u>	- <u>1</u> 2%	201 <u>0</u>	1%
2040	86 <u>5</u>	<u>2</u> 4%	38	0%	206 <u>5</u>	3%
2050	86	<u>3</u> 2%	39	<u>2</u> -4%	207 <u>6</u>	4%
2060	87 <u>6</u>	3%	39	<u>2</u> 4%	209 <u>8</u>	<u>5</u> 4%

ERRATA NOTE: Same changes to values in Table 39 in Appendix G. No figure change required.

**Table 4-36. Projected Flows and Percent Change from 2009 Flows
during Average Rainfall Year and 50 Percent Capture
at the Peace River at Arcadia Flow Station with the South Pasture Extension Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	713	0%	328	0%	1,657	0%
2020	726 725	2%	332	1%	1,702 1,700	3%
2030	738 737	3%	335	2%	1,741 1,744	5%
2040	754 754	6%	342	5%	1,785 1,784	8%
2050	772 774	8%	350	7%	1,829 1,827	10%
2060	783 782	10%	355	8%	1,858 1,856	12%

ERRATA NOTE: Same changes to values in Table 41 in Appendix G. No figure change required.

**Table 4-38. Projected Flows and Percent Change from 2009 Flows
during Low Rainfall Year and 50 Percent Capture
at the Peace River at Arcadia Flow Station with the South Pasture Extension Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	330	0%	152	0%	766	0%
2020	337 336	2%	154	1%	787	3%
2030	342	4%	156	3% 2%	806 806	5%
2040	350	6%	159	5%	827 827	8%
2050	358	9% 8%	163	7%	848 847	11%
2060	363	10%	165	9% 8%	862 864	13% 12%

ERRATA NOTE: Same changes to values in Table 43 in Appendix G. No figure change required.

Table 4-114. Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 50 Percent Capture at the Horse Creek Flow Station with Three Current Actions and Two Reasonably Foreseeable Actions in the Horse Creek Subwatershed						
	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	171	0%	78	0%	404	0%
2020	<u>172</u> 166	<u>1%</u> -3%	<u>78</u> 68	<u>0%</u> -12%	<u>411</u> 398	2%
2030	<u>160</u> 155	<u>-6%</u> -9%	<u>72</u> 65	<u>-7%</u> -16%	<u>385</u> 374	<u>-5%</u> -7%
2035	<u>159</u> 154	<u>-7%</u> -10%	<u>71</u> 65	<u>-8%</u> -17%	<u>382</u> 374	<u>-6%</u> -8%
2040	<u>162</u> 156	<u>-5%</u> -9%	<u>73</u> 66	<u>-6%</u> -16%	<u>389</u> 375	<u>-4%</u> -7%
2050	<u>168</u> 161	<u>-2%</u> -6%	<u>75</u> 67	<u>-3%</u> -14%	<u>403</u> 389	<u>0%</u> -4%
2060	<u>173</u> 167	<u>1%</u> -2%	<u>78</u> 68	<u>0%</u> -12%	<u>415</u> 402	<u>3%</u> -1%

ERRATA NOTE: Same changes to values in Table 77 and replaced Figure 91 in Appendix G.

Table 4-116. Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 50 Percent Capture at the Horse Creek Flow Station with Three Current Actions and Two Reasonably Foreseeable Actions in the Horse Creek Subwatershed						
	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	84	0%	38	0%	199	0%
2020	<u>85</u> 84	<u>1%</u> 0%	<u>38</u> 32	<u>0%</u> -16%	<u>202</u> 201	<u>2%</u> 1%
2030	<u>79</u> 77	<u>-6%</u> -8%	<u>35</u> 34	<u>-7%</u> -20%	<u>189</u> 186	<u>-5%</u> -6%
2035	<u>78</u> 77	<u>-7%</u> -8%	<u>35</u> 34	<u>-8%</u> -19%	<u>188</u> 186	<u>-6%</u> -7%
2040	<u>80</u> 78	<u>-5%</u> -7%	<u>36</u> 34	<u>-6%</u> -18%	<u>191</u> 188	<u>-4%</u> -5%
2050	<u>82</u> 81	<u>-2%</u> -4%	<u>37</u> 34	<u>-3%</u> -17%	<u>198</u> 195	<u>0%</u> -2%
2060	<u>85</u> 84	<u>1%</u> 0%	<u>38</u> 32	<u>0%</u> -16%	<u>204</u> 202	<u>3%</u> 1%

ERRATA NOTE: Same changes to values in Table 79 and replaced Figure 93 in Appendix G.

**Table 4-118. Projected Flows and Percent Change from 2009 Flows
during Average Rainfall Year and 50 Percent Capture
at the Peace River at Arcadia Flow Station with Three Current Actions
and One Reasonably Foreseeable Action in Peace River at Arcadia**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	713	0%	328	0%	1,657	0%
2020	<u>726</u> 724	2%	<u>332</u> 334	1%	<u>1,702</u> 1,696	<u>32</u> %
2030	<u>737</u> 734	3%	<u>335</u> 334	2%	<u>1,739</u> 1,733	5%
2040	<u>753</u> 754	<u>56</u> %	<u>342</u> 344	4%	<u>1,782</u> 1,777	<u>87</u> %
2050	<u>770</u> 768	8%	<u>350</u> 349	7%	<u>1,825</u> 1,848	10%
2060	<u>780</u> 777	9%	<u>354</u> 353	8%	<u>1,852</u> 1,846	<u>124</u> %

ERRATA NOTE: Same changes to values in Table 81 in Appendix G. No figure change required.

**Table 4-120. Projected Flows and Percent Change from 2009 Flows
during Low Rainfall Year and 50 Percent Capture
at the Peace River at Arcadia Flow Station with Three Current Actions
and One Reasonably Foreseeable Action in Peace River at Arcadia**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	330	0%	152	0%	766	0%
2020	<u>336</u> 335	2%	154	1%	<u>787</u> 784	<u>32</u> %
2030	<u>341</u> 340	3%	155	2%	<u>805</u> 802	5%
2040	<u>349</u> 348	6%	159	<u>5%</u> 4%	<u>826</u> 823	8%
2050	<u>358</u> 356	8%	162	7%	<u>846</u> 843	<u>110</u> %
2060	<u>362</u> 364	<u>109</u> %	164	8%	<u>859</u> 855	12%

ERRATA NOTE: Same changes to values in Table 83 in Appendix G. No figure change required.

**Table 4-122. Projected Contributions to the Charlotte Harbor Estuary
and Percent Change from 2009 Flows during Average Rainfall Year
and 50 Percent Capture with All Four Current Actions
and the Two Foreseeable Actions in the Myakka and Peace River Watersheds**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	1,794	0%	747	0%	3,884	0%
2020	1,8281,824	2%	761750	2%1%	3,9783,958	2%
2030	1,8431,836	3%2%	766758	3%2%	4,0244,008	4%3%
2040	1,8721,864	4%	779771	4%3%	4,0914,072	5%
2050	1,9121,903	7%6%	797788	7%5%	4,1854,164	8%7%
2060	1,9371,928	8%7%	808798	8%7%	4,2444,223	9%

ERRATA NOTE: Same changes to values in Table 93 in Appendix G. No figure change required.

**Table 4-124. Projected Contributions to the Charlotte Harbor Estuary
and Percent Change from 2009 Flows during Low Rainfall Year
and 50 Percent Capture with All Four Current Actions
and the Two Foreseeable Actions in the Myakka and Peace River Watersheds**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	1,116	0%	451	0%	2,354	0%
2020	1,1371,134	2%	460453	2%0%	2,4092,404	2%
2030	1,1471,145	3%	464459	3%1%	2,4402,434	43%
2040	1,1641,164	4%	471466	4%3%	2,4752,470	5%
2050	1,1871,184	6%	482476	7%5%	2,5302,523	7%
2060	1,2011,198	8%7%	488481	8%7%	2,5612,555	9%

ERRATA NOTE: Same changes to values in Table 95 in Appendix G. No figure change required.

TABLE 85

Projected Contributions to the Upper Charlotte Harbor Estuary and Percent Change from 2009 Flows during Average Rainfall Year and 50 Percent Capture with All Current and Foreseeable Actions within the Peace River Watershed

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	1,119	0%	510	0%	2,631	0%
2020	<u>1,144</u> 1,136	2%	<u>520</u> 510	<u>2%</u> 0%	<u>2,707</u> 2,687	<u>3%</u> 2%
2030	<u>1,153</u> 1,146	<u>3%</u> 2%	<u>523</u> 515	<u>2%</u> 1%	<u>2,738</u> 2,722	<u>4%</u> 3%
2040	<u>1,182</u> 1,173	<u>6%</u> 5%	<u>535</u> 527	<u>5%</u> 3%	<u>2,806</u> 2,787	<u>7%</u> 6%
2050	<u>1,214</u> 1,205	<u>9%</u> 8%	<u>550</u> 541	<u>8%</u> 6%	<u>2,883</u> 2,862	<u>10%</u> 9%
2060	<u>1,238</u> 1,229	<u>11%</u> 10%	<u>561</u> 550	<u>10%</u> 8%	<u>2,940</u> 2,920	<u>12%</u> 11%

ERRATA NOTE: Changed Figure 99.

TABLE 87

Projected Contributions to the Upper Charlotte Harbor Estuary and Percent Change from 2009 Flows during Low Rainfall Year and 50 Percent Capture with All Current and Foreseeable Actions within the Peace River Watershed

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	568	0%	259	0%	1,338	0%
2020	<u>582</u> 580	<u>3%</u> 2%	<u>264</u> 258	<u>2%</u> 0%	<u>1,378</u> 1,374	3%
2030	<u>588</u> 586	<u>4%</u> 3%	<u>266</u> 261	<u>3%</u> 1%	<u>1,396</u> 1,392	4%
2040	<u>603</u> 601	6%	<u>273</u> 268	<u>6%</u> 4%	<u>1,432</u> 1,430	7%
2050	<u>620</u> 618	9%	<u>281</u> 275	<u>9%</u> 6%	<u>1,473</u> 1,471	10%
2060	<u>633</u> 630	<u>12%</u> 11%	<u>287</u> 280	<u>11%</u> 8%	<u>1,504</u> 1,499	12%

ERRATA NOTE: No figure change required.

Appendix C:

Replacement Pages for Chapter 4

4.2.1.1 No Action Alternative: Degree and Significance of Surface Water Resource Effects

Under the No Action Alternative - No Mining scenario, as shown above, increases in flow in all subwatersheds and watersheds are illustrative of the increased flow caused by changing land use through urbanization. This scenario will be used for comparative purposes for the rest of this Chapter.

Under the No Action Alternative - Upland Mining Only scenario, the capture areas associated with the mines on the four parcels would be smaller than under the Applicants' Preferred Alternatives as the mines within upland areas alone would presumably be smaller than mines that would also impact wetlands or waters, and the effect of the capture area would reduce the downstream flows compared to the 'no mining' scenario, which assumes no capture areas. The degree of effect for the No Action Alternative - Upland Only scenario would vary by mine and by subwatershed, as is the case for the alternatives described below. At most, the degree of the effect would be less than any of the degree of effects documented below as the Upland Mining Only scenario would be a subset of mining proposed. As for all phosphate mines, under local and state permitting requirements the applicants would be required to implement mitigation measures such as recharge ditches or wells, and monitor base flows in potentially affected waterways. Mitigation would lower the degree of effect and make any effects not significant.

4.2.2 Alternative 2: Desoto Mine

The proposed Desoto Mine is located mostly in the Horse Creek subwatershed (88% - 15,993 acres), but a portion is in the Peace River at Arcadia subwatershed (10% - 1,919 acres) and the Lower Myakka/Big Slough subwatershed (2% - 375 acres). Mosaic proposes to construct an initial clay settling area (CSA), a beneficiation plant, and initial mine infrastructure corridors. The Desoto Mine anticipated schedule has mining to continue for the first 13 years of the mine life, and reclamation to continue to mine year 23. Mosaic anticipates beginning mining at the Desoto Mine in 2021; therefore, mining should be complete by 2034 and reclamation by 2044.

The capture area graph for the Desoto Mine is presented in Figure 4-3. Because of the four draglines proposed matrix excavation, mining effects would occur in the subwatersheds at different times and to varying levels of impact. As indicated in Figure 4-3, mining activities would affect the two main subwatersheds concurrently for much of this mine's life cycle. The capture area would increase for the first portion of the life cycle as more and more of the land is incorporated into the mine's operations. Past a certain point in any given mine's life cycle, the capture area curve descends--reflecting the stage at which gradual reclamation and land release is occurring from the mine operations. This results in a proportionate amount of the land area returning to contribute runoff to the pre-mining conditions. Where the mine's footprint affects multiple subwatersheds within a larger watershed, the runoff analysis accounts for the capture area for that portion of the mine's footprint associated with each subwatershed. Thus, in terms of understanding what the mining effects are, where they occur (i.e., what streams are affected),

- 1 when the effects begin, and how long they last, it is essential to consider these changes in time and
- 2 space as part of the impact assessment.

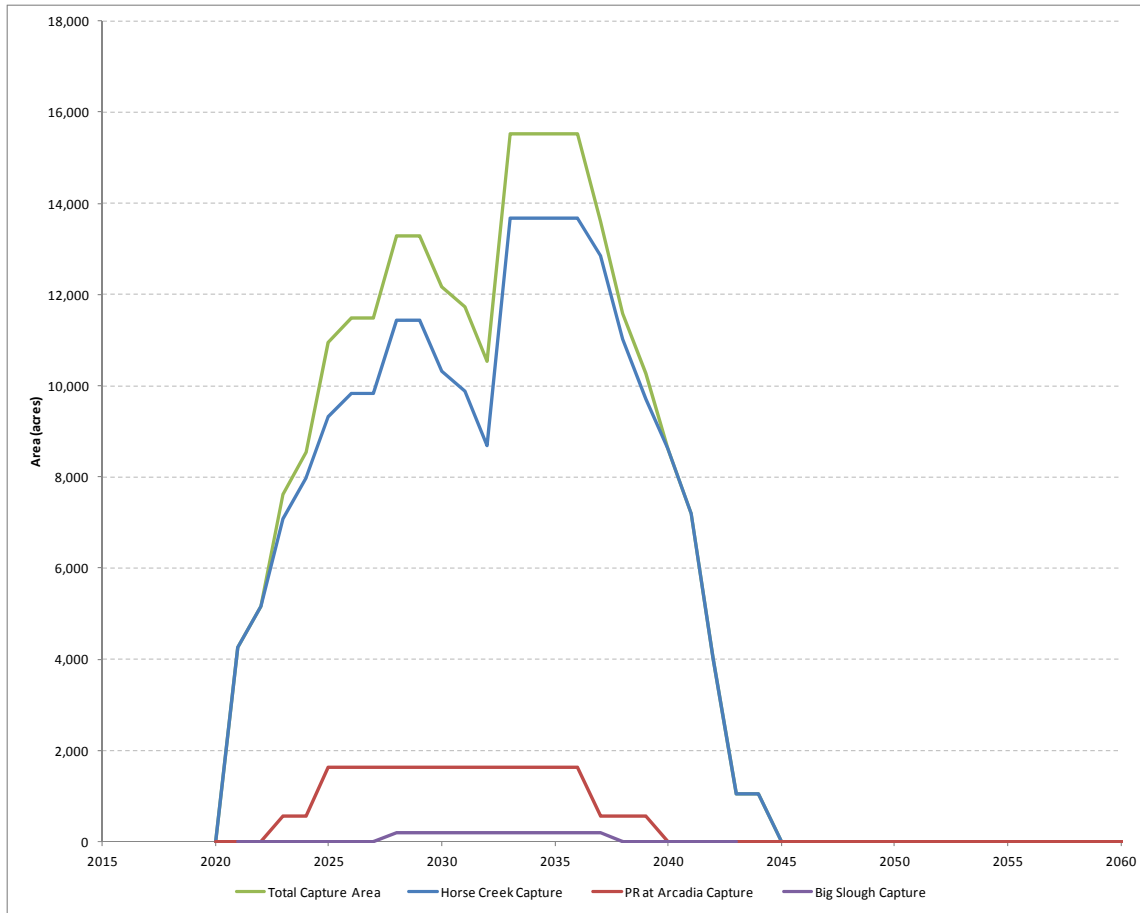


Figure 4-3. Desoto Mine Stormwater Capture Area Graph

- 5 The capture of stormwater in an active mine was evaluated for the most conservative bounding condition,
- 6 where 100 percent of the stormwater (i.e., excess precipitation, as defined in Appendix J) is captured.
- 7 Evaluations were also performed using a 50 percent-capture condition, which the Applicants indicated is
- 8 still a high estimate of their standard practices. To illustrate the effect on stream flow at these
- 9 subwatersheds under annual average rainfall conditions, 50 inches per year was applied for the surface
- 10 water calculations in the Peace River watershed. The evaluation was repeated under low rainfall
- 11 conditions (43 inches per year). This low rainfall value was selected because SWFWMD permits irrigation
- 12 water use for similar low rainfall conditions. Forty-three inches per year is also about the lowest 20th
- 13 percentile of the long-term average rainfall in the region. The detailed results are presented in Appendix
- 14 G for this and all alternatives.

4.2.2.1 Desoto Mine Effects on Horse Creek

Tables 4-11 and 4-12 present the annual average and seasonal flow rates calculated for an average rainfall year for Horse Creek with the Desoto Mine for the 100 percent and 50 percent stormwater capture, respectively. Tables 4-13 and 4-14 present the annual average and seasonal flow rates calculated in a low rainfall year for Horse Creek with the Desoto Mine for the 100 percent and 50 percent stormwater capture, respectively.

The largest influence on streamflow from the Horse Creek subwatershed from the mining capture areas of the Desoto Mine was predicted to occur around 2035. To ensure that the peak impact was represented, an extra computation was conducted for 2035 for this alternative. When considering the condition of 100 percent capture of stormwater in the mining capture area of the Desoto Mine, Horse Creek may have an average annual flow of approximately 173 cfs without the Desoto Mine, and approximately 157 cfs with the Desoto Mine during average rainfall conditions. This corresponds to a decrease in flow of approximately 16 cfs, or 9 percent below the No Action Alternative conditions; and a decrease in flow of approximately 14 cfs, or 8 percent of the calculated 2009 average annual flow of 171 cfs. When considering the 50 percent stormwater capture condition, the annual average flow in Horse Creek may be approximately 166 cfs with the Desoto Mine during average rainfall conditions. This corresponds to a decrease in flow of approximately 7 cfs, or 5 percent below the No Action Alternative conditions; and a decrease in flow of approximately 5 cfs, or 3 percent below the calculated 2009 average annual flow.

**Table 4-11. Projected Flows and Percent Change from 2009 Flows
during Average Rainfall Year and 100 Percent Capture
at the Horse Creek Flow Station with the Desoto Mine**

Year	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	171	0%	78	0%	404	0%
2020	173	1%	78	0%	413	2%
2030	161	-6%	72	-7%	387	-4%
2035	157	-8%	71	-9%	378	-6%
2040	164	-4%	74	-5%	394	-2%
2050	175	3%	79	2%	422	4%
2060	177	3%	79	2%	424	5%

**Table 4-12. Projected Flows and Percent Change from 2009 Flows
during Average Rainfall Year and 50 Percent Capture
at the Horse Creek Flow Station with the Desoto Mine**

Year	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	171	0%	78	0%	404	0%
2020	173	1%	78	0%	413	2%
2030	167	-2%	75	-3%	401	-1%
2035	166	-3%	75	-4%	399	-1%
2040	169	-1%	76	-2%	407	1%
2050	175	3%	79	2%	422	4%
2060	177	3%	79	-2%	424	5%

The same evaluation was performed for a low rainfall year with similar results. Tables 4-13 and 4-14 present the annual average flows and seasonal flow rates calculated for a low rainfall year for Horse Creek subwatershed with the Desoto Mine for the 100 percent and 50 percent stormwater capture scenario, respectively. When considering the condition of 100 percent capture of stormwater in the mining capture area of the Desoto Mine, Horse Creek may have an average annual flow of approximately 85 cfs without the Desoto Mine, and approximately 77 cfs with the Desoto Mine during low rainfall conditions. This corresponds to a decrease in flow of approximately 9 percent below the No Action Alternative conditions; and a decrease in flow of approximately 7 cfs, or 8 percent of the calculated 2009 average annual flow of 84 cfs. When considering the 50 percent stormwater capture condition, the annual average flow in Horse Creek was reduced by a proportional percentage (about half the impact).

1

Table 4-13. Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 100 Percent Capture at the Horse Creek Flow Station with the Desoto Mine						
	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	84	0%	38	0%	199	0%
2020	85	1%	38	0%	203	2%
2030	79	-6%	36	-7%	190	-4%
2035	77	-8%	35	-9%	186	-6%
2040	81	-4%	36	-5%	194	-2%
2050	86	3%	39	2%	207	4%
2060	87	3%	39	2%	209	5%

2

Table 4-14. Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 50 Percent Capture at the Horse Creek Flow Station with the Desoto Mine						
	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	84	0%	38	0%	199	0%
2020	85	1%	38	0%	203	2%
2030	82	-2%	37	-3%	197	-1%
2035	82	-3%	37	-4%	196	-1%
2040	83	-1%	37	-2%	200	1%
2050	86	3%	39	2%	207	4%
2060	87	3%	39	2%	209	5%
Note: Variations in percentages with similar flow values is related to rounding nuances. Desoto Mine Effects on Peace River at Arcadia						

3

Tables 4-15 and 4-16 present the annual average flows and seasonal flow rates calculated in an average rainfall year for Peace River at Arcadia gage stations with the Desoto Mine for the 100 percent and 50 percent stormwater capture, respectively. Tables 4-17 and 4-18 present the annual average flows and seasonal flow rates calculated in a low rainfall year for Peace River at Arcadia gage stations with the Desoto Mine for the 100 percent and 50 percent stormwater capture, respectively.

The largest influence on streamflow from the Peace River at Arcadia subwatershed from the mining capture areas of the Desoto Mine was predicted to occur in 2030. When considering the more conservative stormwater capture condition, 100 percent capture within the mining capture area of the Desoto Mine, Peace River at Arcadia may have an average annual flow of approximately 738 cfs without the Desoto Mine in 2030, and approximately 737 cfs with the Desoto Mine during average rainfall conditions in the same year. This corresponds to a decrease in flow of approximately 1 cfs, or less than 1 percent below the No Action Alternative conditions. There is an increase in flow of approximately 24 cfs, or 3 percent above the calculated 2009 average annual flow of 713 cfs because of the predicted land use shifts in the watershed toward urbanization. When considering the 50 percent stormwater capture condition the annual average flow in Peace River at Arcadia may be approximately 738 cfs with the Desoto Mine during average rainfall conditions. This corresponds to a negligible decrease in flow below the No Action Alternative, but an increase in flow of approximately 25 cfs, or 3 percent above the calculated 2009 average annual flow. Flow increases from the 2009 levels can also be attributed to predicted changes in land uses from urbanization and the release of reclaimed land of existing mines in areas upstream of this subwatershed. The effect on annual average flow from the Peace River at Arcadia subwatershed during average rainfall conditions is indistinguishable from the No Action Alternative.

**Table 4-15. Projected Flows and Percent Change from 2009 Flows
during Average Rainfall Year and 100 Percent Capture
at the Peace River at Arcadia Flow Station with the Desoto Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	713	0%	328	0%	1,657	0%
2020	726	2%	332	1%	1,702	3%
2030	737	3%	335	2%	1,740	5%
2040	754	6%	343	5%	1,785	8%
2050	772	8%	351	7%	1,829	10%
2060	783	10%	355	8%	1,858	12%

1

**Table 4-16. Projected Flows and Percent Change from 2009 Flows
during Average Rainfall Year and 50 Percent Capture
at the Peace River at Arcadia Flow Station with the Desoto Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	713	0%	328	0%	1,657	0%
2020	726	2%	332	1%	1,702	3%
2030	738	3%	336	2%	1,741	5%
2040	754	6%	343	5%	1,785	8%
2050	772	8%	351	7%	1,829	10%
2060	783	10%	355	8%	1,858	12%

2

3 Tables 4-17 and 4-18 present the flow and percent change from 2009 average annual and seasonal flows
4 during a low rainfall year with 100 and 50 percent capture of stormwater, respectively. Changes in flows
5 are indistinguishable from the No Action Alternative.

**Table 4-17. Projected Flows and Percent Change from 2009 Flows
during Low Rainfall Year and 100 Percent Capture
at the Peace River at Arcadia Flow Station with the Desoto Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	330	0%	152	0%	766	0%
2020	337	2%	154	1%	787	3%
2030	342	4%	156	2%	806	5%
2040	350	6%	159	5%	827	8%
2050	358	9%	163	7%	848	11%
2060	363	10%	165	9%	862	13%

6

**Table 4-18. Projected Flows and Percent Change from 2009 Flows
during Low Rainfall Year and 50 Percent Capture
at the Peace River at Arcadia Flow Station with the Desoto Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	330	0%	152	0%	766	0%
2020	337	2%	154	1%	787	3%
2030	342	4%	156	3%	806	5%
2040	350	6%	159	5%	827	8%
2050	358	9%	163	7%	848	11%
2060	363	10%	165	9%	862	13%

4.2.2.2 Desoto Mine Effects on Lower Myakka/Big Slough Subwatershed

An analysis was not conducted for the effect of the mining of 375 acres within the Myakka River subwatershed. The Lower Myakka/Big Slough subwatershed has approximately 127 percent of the stream flow as the Horse Creek subwatershed, but the mining area proposed in that watershed is 2 percent of the size mining area compared to the Desoto Mine area proposed in the Horse Creek. After reviewing the effects on the Horse Creek stream flow (reductions that are less than 10 percent when the stream flow is less and the area of mining is 42 times greater), any effect on the stream flow within the Lower Myakka/Big Slough subwatershed was determined to be insubstantial.

4.2.2.3 Desoto Mine: Degree and Significance of Surface Water Resource Effects

While the Horse Creek flow rate from mining is projected to decrease up to 9 percent during a low rainfall year in the dry season with a 100 percent capture area, the decrease in flow rates falls within the error range for this analysis, which is based on extremely variable parameter (rainfall). The reduction in flows within Horse Creek may be indicative of a change at the Horse Creek subwatershed level; therefore, the effect cannot be considered minor. For a major effect, there must be an extended effect on surface water flows at least at the subwatershed level that also leads to a violation of the MFLs for the subwatershed. In addition to the potential reductions being within one order of significant figures, there are no SWFWMD MFLs established for Horse Creek to which flow reductions can be compared. For this reason (no contribution to a violation of MFLs for Horse Creek and a change in stream flow rates that falls within the expected error range), the effect on surface water flows within Horse Creek cannot be considered to have a major effect. The apparent reduction in flow is indicative of a change beyond the boundaries of the mine within the Horse Creek subwatershed even though the degree may be within the realm of natural

variation. Therefore, the effects would be moderate without mitigation within the Horse Creek subwatershed and minor with mitigation. Given the moderate level of an effect for this mine within the watershed, the effect is expected to be significant without mitigation and not significant when mitigation is considered.

Possible measures that would reduce the moderate degree of effect, mitigate the intensity factors, and potentially make the effect not significant include recharge ditches and wells to maintain base flow in Horse Creek and its tributaries, or reducing the capture area. There are also monitoring program and other provisions in FDEP mining permits. If it is determined through monitoring that there is an unanticipated impact to the creek, the Applicants would need to address those impacts.

The effects within the Peace River at Arcadia and Lower Myakka/Big Slough subwatersheds are none to minor and are not considered significant.

The individual effect of the Desoto Mine on the Peace River watershed and on Charlotte Harbor is none to minor, which is not significant. The moderate (without mitigation) degree of effect on Horse Creek and minor degree of effect on the Peace River at Arcadia are overwhelmed at this scale by the contributions of other tributaries, and over time by the predicted increases in flow due to changes in land use. These effects are described further in the No Action Alternative section above (4.2.1) and in the surface water resources cumulative effects section (4.12.2).

4.2.3 Alternative 3: Ona Mine

The proposed Ona Mine is located mostly in the Horse Creek subwatershed (77% - 17,242 acres), but includes some small portions in the Peace River at Arcadia subwatershed (22% - 4,808 acres) and the Upper Myakka River subwatershed (1% - 269 acres). Mosaic proposes to use the CSAs in two existing mines to support the initial stages of mining at the Ona Mine. This would allow mining to begin without having to construct a new CSA on unmined ground. The use of existing CSAs would also allow the use of mine corridors in these two existing mines, reduce the CSA footprint in the new mine, and reduce overall surface water capture time and acres for this mine. The Ona Mine anticipated schedule has mining to continue for the first 29 years of the mine operations, and reclamation to continue to mine year 45. Mosaic anticipates beginning mining at the Ona Mine site in 2020; therefore, reclamation should be complete by 2065.

The capture area curve for the Ona Mine site is presented In Figure 4-4 and reflects the gradual increase in acreage included in the recirculation system boundary over the roughly 29-year period of active mining, with a gradual return of lands to contribute to downstream flows as reclamation rates exceed the mining rates and result in a net decrease in the capture area acreages. On the basis of this analysis, the peak years of capture are predicted to occur toward the end of the period of matrix extraction, after which

- 1 reclamation and land release would gradually return the full mine footprint to contributing runoff to
- 2 downstream waters.

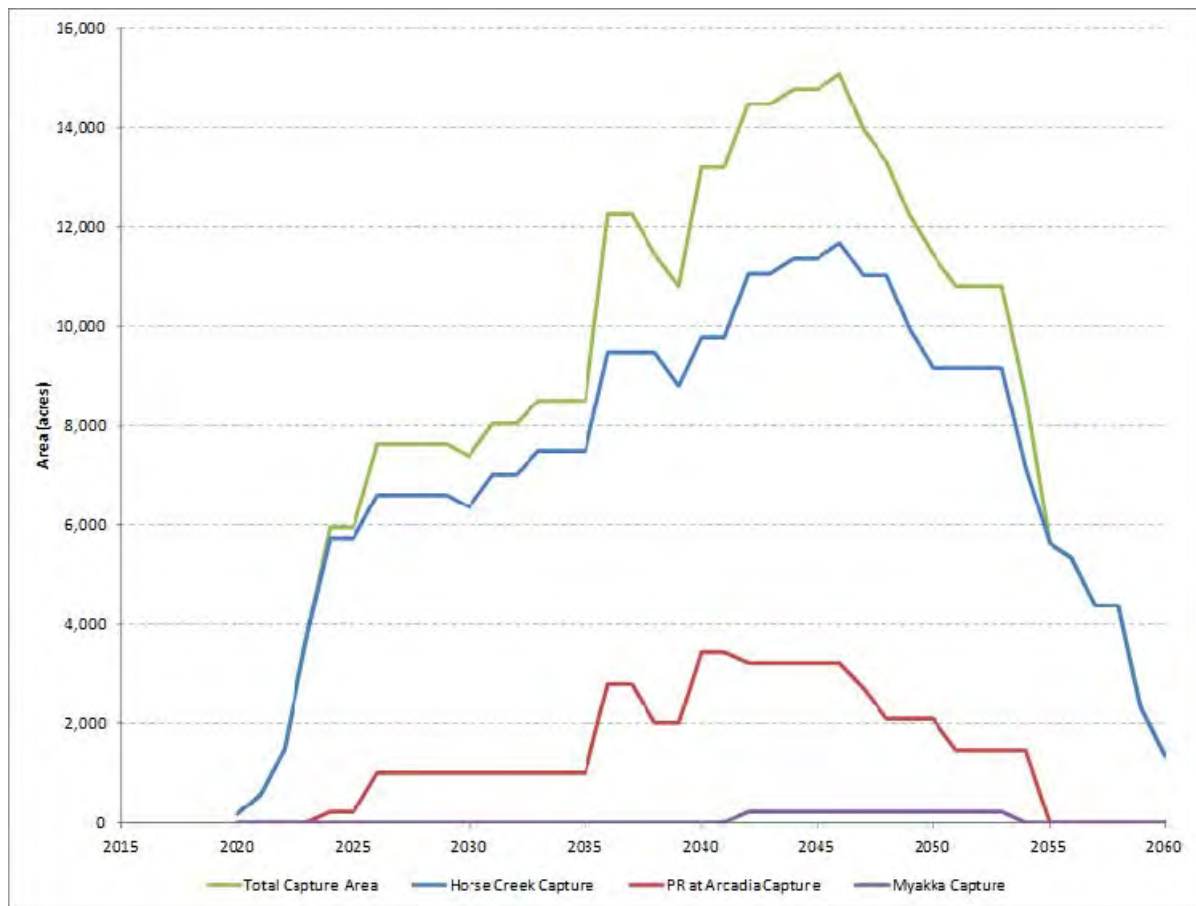


Figure 4-4. Ona Mine Stormwater Capture Area Graph

The mining sequence indicates that for approximately the first 15 years of mine operations, mining would occur only in the Horse Creek subwatershed, with no mining during that period in the Peace River at Arcadia and Upper Myakka River subwatersheds. The acreages of proposed mining in these two subwatersheds are relatively small in their respective subwatersheds, and the duration of influence much shorter than the likely influence on the Horse Creek subwatershed.

4.2.3.1 Ona Mine Effects on Upper Myakka River

An analysis was not conducted for the effect of the mining of 269 acres within the Myakka River subwatershed. The Myakka River subwatershed has approximately 142 percent of the stream flow as the Horse Creek subwatershed, but the mining area proposed in that watershed is 1 percent of the size mining area compared to the Ona Mine area proposed in the Horse Creek. After reviewing the effects on the Horse Creek stream flow (reductions that are less than 10% when the stream flow is less and the

area of mining is 100 times greater), any effect on the stream flow within the Myakka River subwatershed was determined to be insubstantial.

4.2.3.2 Ona Mine Effects on Horse Creek

Tables 4-19 and 4-20 present the annual average flows and seasonal flow rates calculated for an average annual rainfall for Horse Creek with the Ona Mine for the 100 percent and 50 percent stormwater capture scenario, respectively. Tables 4-21 and 4-22 present the annual average flows and seasonal flow rates calculated for an average low rainfall year for Horse Creek with the Ona Mine for the 100 percent and 50 percent stormwater capture scenario, respectively.

The largest influence on streamflow from the Horse Creek subwatershed from the mining capture areas of the Ona Mine was predicted to occur from 2040 to 2045. To ensure that the peak impact was represented, an extra computation was conducted for 2045 for this alternative. When considering the condition of 100 percent capture, Horse Creek may have an average annual flow of approximately 173 to 174 cfs without the Ona Mine, and approximately 161 to 162 cfs with the Ona Mine during average rainfall conditions. This corresponds to a decrease in flow of approximately 11 to 13 cfs, or 6 to 8 percent below the No Action Alternative conditions; and a decrease in flow of approximately 9 to 10 cfs, or 5 to 6 percent below the calculated 2009 average annual flow of 171 cfs. When considering the 50 percent capture condition, the annual average flow in Horse Creek may be approximately 168 cfs with the Ona Mine during average rainfall conditions. This corresponds to a decrease in flow of approximately 5 cfs, or 3 percent below the No Action Alternative conditions; and a decrease in flow of approximately 3 cfs, or 1 percent below the calculated 2009 average annual flow.

**Table 4-19. Projected Flows and Percent Change from 2009 Flows
during Average Rainfall Year and 100 Percent Capture
at the Horse Creek Flow Station with the Ona Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	171	0%	78	0%	404	0%
2020	172	1%	78	0%	413	2%
2030	166	-3%	74	-4%	398	-2%
2040	162	-5%	73	-6%	391	-3%
2045	161	-6%	72	-7%	387	-4%
2050	161	-4%	74	-5%	395	-2%
2060	175	2%	79	1%	420	4%

**Table 4-20 Projected Flows and Percent Change from 2009 Flows
during Average Rainfall Year and 50 Percent Capture
at the Horse Creek Flow Station with the Ona Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	171	0%	78	0%	404	0%
2020	172	1%	78	0%	413	2%
2030	169	-1%	76	-2%	407	1%
2040	168	-1%	76	-3%	405	0%
2045	168	-1%	76	-2%	405	0%
2050	170	-1%	76	-2%	408	1%
2060	176	3%	79	2%	422	4%

The same evaluation was performed for a low rainfall year with similar results. Table 4-21 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 100 percent capture of stormwater in the capture area of the Ona Mine at the Horse Creek flow station. When considering the condition of 100 percent capture of stormwater in the mining capture area of the Ona Mine, Horse Creek may have an average annual flow of approximately 86 cfs without the Ona Mine, and approximately 79 cfs with the Ona Mine during low rainfall conditions. This corresponds to a decrease in flow of approximately 8 percent below the No Action Alternative conditions; and a decrease in flow of approximately 5 cfs, or 6 percent of the calculated 2009 average annual flow of 84 cfs. When considering the 50 percent stormwater capture condition (Table 4-22), the annual average flow in Horse Creek was reduced by a proportional percentage (about one half the impact).

**Table 4-21. Projected Flows and Percent Change from 2009 Flows
during Low Rainfall Year and 100 Percent Capture
at the Horse Creek Flow Station with the Ona Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	84	0%	38	0%	199	0%
2020	85	1%	38	0%	203	2%
2030	81	-3%	37	-4%	195	-2%
2040	80	-5%	36	-6%	192	-3%
2045	79	-6%	36	-7%	190	-4%
2050	81	-4%	36	-5%	194	-2%
2060	86	2%	39	1%	207	4%

1

**Table 4-22. Projected Flows and Percent Change from 2009 Flows
during Low Rainfall Year and 50 Percent Capture
at the Horse Creek Flow Station with the Ona Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	84	0%	38	0%	199	0%
2020	85	1%	38	0%	203	2%
2030	83	-1%	37	-2%	200	1%
2040	83	-1%	37	-3%	199	0%
2045	83	-1%	37	-2%	199	0%
2050	83	-1%	37	-2%	201	1%
2060	86	3%	39	2%	208	4%

2

4.2.3.3 Ona Mine Effects on Peace River at Arcadia

Tables 4-23 and 4-24 present the annual average flows and seasonal flow rates calculated for an average annual rainfall year for Peace River at Arcadia with the Ona Mine for the 100 percent and 50 percent stormwater capture scenario, respectively. Tables 4-25 and 4-26 present the annual average

flows and seasonal flow rates calculated for a low rainfall year for Peace River at Arcadia with the Ona Mine for the 100 percent and 50 percent stormwater capture scenario, respectively.

The largest influence on streamflow from the Peace River at Arcadia subwatershed from the mining capture areas of the Ona Mine was predicted to occur in 2040. However, the effect on annual average flow from the Peace River at Arcadia subwatershed during average rainfall conditions was expected to be minimal and likely would not be detected because of the comparatively small area being impacted in the Peace River at Arcadia subwatershed (i.e., one would not be able to determine a change in the monitoring data). When considering the more conservative stormwater capture condition, 100 percent capture within the mining capture area of the Ona Mine, Peace River at Arcadia may have an average annual flow of approximately 754 cfs without the Ona Mine in 2040, and approximately 750 cfs with the Ona Mine during average rainfall conditions in the same year. This corresponds to a decrease in flow of approximately 4 cfs, or less than 1 percent below the No Action Alternative conditions; however, there is an increase in flow of approximately 37 cfs, or 5 percent above the calculated 2009 average annual flow of 713 cfs because of other predicted land use changes in the watershed. When considering the 50 percent stormwater capture condition the annual average flow in Peace River at Arcadia may be approximately 753 cfs with the Ona Mine during average rainfall conditions. This is nearly the same effect as the 100 percent capture area. Both of these effects are so small as to be inconsequential. Flow increases from the 2009 levels can be attributed to predicted changes in land uses from urbanization and the release of reclaimed land of existing mines in areas upstream of this subwatershed.

**Table 4-23. Projected Flows and Percent Change from 2009 Flows
during Average Rainfall Year and 100 Percent Capture
at the Peace River at Arcadia Flow Station with the Ona Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	713	0%	328	0%	1,657	0%
2020	726	2%	332	1%	1,701	3%
2030	736	3%	335	2%	1,741	5%
2040	750	5%	340	4%	1,780	7%
2050	769	8%	349	6%	1,825	10%
2060	782	10%	354	8%	1,858	12%

**Table 4-24. Projected Flows and Percent Change from 2009 Flows
during Average Rainfall Year and 50 Percent Capture
at the Peace River at Arcadia Flow Station with the Ona Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	713	0%	328	0%	1,657	0%
2020	726	2%	332	1%	1,702	3%
2030	738	4%	336	2%	1,742	5%
2040	753	6%	342	4%	1,783	8%
2050	771	8%	350	7%	1,827	10%
2060	783	10%	355	8%	1,858	12%

- 1
- 2 The same evaluation was performed for a low rainfall year. Tables 4-25 and 4-26 present the annual
- 3 average flows and seasonal flow rates calculated for a low rainfall year for Peace River at Arcadia with
- 4 the Ona Mine for the 100 percent and 50 percent stormwater capture scenario, respectively. Changes in
- 5 flows are indistinguishable from the No Action Alternative.

**Table 4-25. Projected Flows and Percent Change from 2009 Flows
during Low Rainfall Year and 100 Percent Capture
at the Peace River at Arcadia Flow Station with the Ona Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	330	0%	152	0%	766	0%
2020	336	2%	154	1%	787	3%
2030	341	3%	155	2%	806	5%
2040	348	5%	158	4%	825	8%
2050	357	8%	162	7%	847	11%
2060	363	10%	164	8%	862	13%

6

**Table 4-26. Projected Flows and Percent Change from 2009 Flows
during Low Rainfall Year and 50 Percent Capture
at the Peace River at Arcadia Flow Station with the Ona Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	330	0%	152	0%	766	0%
2020	336	2%	154	1%	787	3%
2030	342	4%	156	3%	807	5%
2040	349	6%	159	5%	826	8%
2050	358	9%	163	7%	848	11%
2060	363	10%	165	9%	862	13%

4.2.3.4 Ona Mine: Degree and Significance of Surface Water Resource Effects

While the Horse Creek flow rate from mining is projected to decrease up to 9 percent during a low rainfall year in the dry season with a 100 percent capture area, the decrease in flow rates falls within the error range for this analysis which is based on an extremely variable parameter (rainfall). The reduction in flows within Horse Creek may be indicative of a change at the Horse Creek subwatershed level; therefore, the effect cannot be considered minor. For a major effect, there must be an extended effect on surface water flows at least at the subwatershed level that also leads to a violation of the MFLs for the subwatershed. In addition to the potential reductions being within one order of significant figures, there are no SWFWMD MFLs established for Horse Creek to which the flow reduction can be compared. For this reason (no contribution to a violation of MFLs for Horse Creek and a change in stream flow rates that falls within the expected error range), the effect on surface water flows within Horse Creek cannot be considered to have a major effect. The apparent reduction in flow is indicative of a change beyond the boundaries of the mine within the Horse Creek subwatershed even though the degree may be within the realm of natural variation. Therefore, the effects would be moderate without mitigation and minor with mitigation within the Horse Creek subwatershed. Given the moderate level of an effect for this mine within the watershed, the effect is expected to be significant without mitigation but not significant with mitigation considered.

Possible measures that would reduce the moderate degree of effect, mitigate the intensity factors, and potentially make the effects not significant include recharge ditches and wells to maintain base flow in Horse Creek and its tributaries, or reducing the capture area. There are also monitoring program and other provisions in FDEP mining permits. If it is determined through monitoring that there is an unanticipated impact to the creek, the Applicants would need to address those impacts.

The effects within the Peace River at Arcadia and Upper Myakka River subwatersheds are minor to no effect and are not considered significant.

The individual effect of the Ona Mine on the Myakka and Peace River watersheds and on Charlotte Harbor is none to minor, which is not significant. The moderate (without mitigation) degree of effect on Horse Creek and minor degree of effect on the Peace River at Arcadia and Upper Myakka River are overwhelmed at this scale by the contributions of other tributaries, and over time by the predicted increases in flow due to changes in land use. These effects are described further in the No Action Alternative section above (4.2.1) and in the surface water resources cumulative effects section (4.12.2).

4.2.4 Alternative 4: Wingate East Mine

The proposed Wingate East Mine is located primarily in the Upper Myakka River subwatershed (90% - 3,280 acres) with an additional portion in the Horse Creek subwatershed (10% - 355 acres). The Wingate East Mine expansion is one-fifth the size of the Desoto Mine and one-sixth the size of the Ona Mine by comparison. This mine as proposed would use the CSAs, beneficiation plant, and mine infrastructure corridors of the existing Wingate Creek Mine. The Wingate East Mine anticipated schedule has mining to continue for the first 28 years of the mine operations, and reclamation to continue to mine year 41. Mosaic proposes to begin mining in this site in 2020; therefore, mining should be complete by 2048 and reclamation should be complete by 2061.

The capture area curve for the Wingate East Mine site is presented in Figure 4-5 and reflects the gradual increase in acreage included in the recirculation system boundary over the roughly 28-year period of active mining, with a gradual return of lands to contribute to downstream flows as reclamation rates exceed the mining rates and result in a net decrease in the capture area acreages. On the basis of this analysis, the peak years of capture are predicted to occur over most of the period of matrix extraction, after which reclamation and land release would gradually return the full mine footprint to contributing runoff to downstream waters. Approximately two-thirds of this mine is proposed to be mined using a dredge and the other third to be mined by draglines. Because the wet dredge process does not facilitate the storage of additional water onsite (because the pits are already full of water), it was assumed that only half as much capture of stormwater would occur with this alternative. Reductions in surface water from the mine capture were only applied at half the area shown on the capture curve for this mine, so effectively this alternative was analyzed at 25 and 50 percent capture, but the naming convention was not changed for discussion consistency in the AEIS. Like the dragline mines, the wet dredge scenarios with this changed assumption capture a much higher percentage of stormwater than the Applicants indicate that they would use in practice.

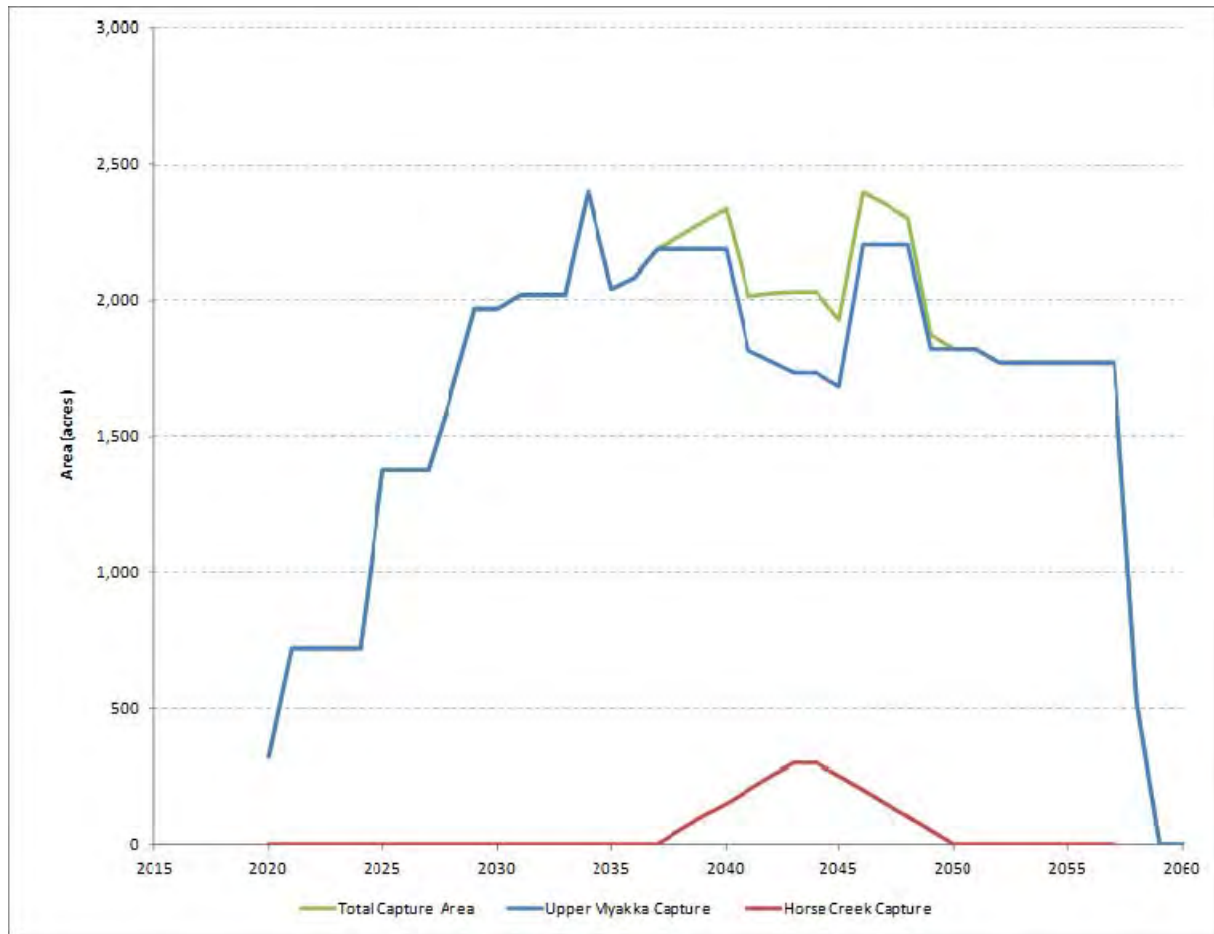


Figure 4-5. Wingate East Mine Stormwater Capture Area Graph

The mining sequence is reflected in the capture area and indicates that from 2025 to 2055, mining would occur in the Upper Myakka River subwatershed.

4.2.4.1 Wingate East Mine Effects on Horse Creek

The Wingate East Mine's potential impacts on the Horse Creek subwatershed were not calculated because of the very small size of the mine in this subwatershed. Approximately 355 acres of the Wingate East Mine are within the Horse Creek subwatershed. It is not expected that mining this relatively small percentage of the overall subwatershed would have a measurable effect on flows within the subwatershed.

4.2.4.2 Wingate East Mine Effects on Upper Myakka River

Tables 4-27 and 4-28 present the annual average and seasonal flows calculated for an average annual rainfall year for the Myakka River near Sarasota gage station with the Wingate East Mine for the 100 percent and 50 percent stormwater capture, respectively. Tables 4-29 and 4-30 present the annual

average and seasonal flows calculated for a low rainfall year for the Myakka River near Sarasota gage station with the Wingate East Mine for the 100 percent and 50 percent stormwater capture, respectively.

The largest influence on streamflow from the Upper Myakka River subwatershed from the mining capture areas of the Wingate East Mine was predicted to occur from 2030 to 2050. When considering the condition of 100 percent capture, the Myakka River near Sarasota gage station may show an average annual flow of approximately 259 to 272 cfs without the Wingate East Mine, and approximately 257 to 271 cfs with the Wingate East Mine during average rainfall conditions. This corresponds to a decrease in flow of approximately 1 to 2 cfs, or less than 1 percent below the No Action Alternative conditions; and an increase in flow of approximately 14 to 28 cfs, or 6 to 11 percent above the calculated 2009 average annual flow of 243 cfs. When considering the 50 percent stormwater capture condition, the annual average flow from the Upper Myakka River subwatershed may be approximately 258 to 271 cfs with the Wingate East Mine during average rainfall conditions. This corresponds to a decrease in flow of approximately 1 cfs, less than 1 percent below the No Action Alternative conditions; and an increase in flow of approximately 14 to 28 cfs, or 6 to 11 percent above the calculated 2009 average annual flow. Flow increases from the 2009 levels can be attributed to predicted changes in land uses in this subwatershed. Changes to annual average flow from the Upper Myakka River subwatershed during average rainfall conditions were minimal and not likely detectable because of the relatively small area being mined in the Upper Myakka River subwatershed.

**Table 4-27. Projected Flows and Percent Change from 2009 Flows
during Average Rainfall Year and 100 Percent Capture
at the Upper Myakka Flow Station with the Wingate East Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	243	0%	109	0%	589	0%
2020	251	3%	113	3%	607	3%
2030	257	6%	115	6%	620	5%
2040	264	8%	118	9%	635	8%
2050	271	11%	122	12%	652	11%
2060	279	15%	125	15%	671	14%

**Table 4-28. Projected Flows and Percent Change from 2009 Flows
during Average Rainfall Year and 50 Percent Capture
at the Upper Myakka River Flow Station with the Wingate East Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	243	0%	113	0%	589	0%
2020	251	3%	113	0%	607	3%
2030	258	6%	116	2%	622	6%
2040	265	9%	119	5%	638	8%
2050	271	11%	122	8%	654	11%
2060	279	15%	125	11%	671	14%

1

2 The same evaluation was performed for a low rainfall year with similar results. Table 4-29 presents the

3 flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 100

4 percent capture of stormwater in the capture area of the Myakka River near Sarasota gage station. When

5 considering the condition of 100 percent capture of stormwater in the mining capture area of the Wingate

6 East Mine from 2030 to 2050, the Upper Myakka River may have an average annual flow between

7 approximately 210 and 221 cfs without the Wingate East Mine, and approximately 208 to 220 cfs with the

8 Wingate East Mine during low rainfall conditions. This corresponds to a decrease in flow of less than one

9 percent below the No Action Alternative conditions; and an increase in flow of approximately 11 to 23 cfs,

10 or 6 to 11 percent of the calculated 2009 average annual flow of 197 cfs. When considering the 50

11 percent stormwater capture condition (Table 4-30), the difference in the effect to the annual average flow

12 in the Upper Myakka River subwatershed was insubstantial.

**Table 4-29. Projected Flows and Percent Change from 2009 Flows
during Low Rainfall Year and 100 Percent Capture
at the Upper Myakka River Flow Station with the Wingate East Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	197	0%	88	0%	478	0%
2020	204	3%	91	3%	492	3%
2030	208	6%	93	6%	503	5%
2040	214	8%	96	8%	516	8%
2050	220	11%	99	11%	529	11%
2060	226	15%	102	15%	544	14%

1

**Table 4-30. Projected Flows and Percent Change from 2009 Flows
during Low Rainfall Year and 50 Percent Capture
at the Upper Myakka River Flow Station with the Wingate East Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	197	0%	88	0%	478	0%
2020	204	3%	91	3%	492	3%
2030	209	6%	94	6%	505	6%
2040	215	9%	96	9%	517	8%
2050	220	12%	99	12%	530	11%
2060	226	15%	102	15%	544	14%

2

4.2.4.3 Wingate East Mine: Degree and Significance of Surface Water Resource Effects

There is in effect no reduction to the stream flow resulting from the mining of Wingate East either on the Upper Myakka River subwatershed, the Myakka River watershed, or Charlotte Harbor, and no significant impact on the Horse Creek subwatershed. Therefore, the effect of this Alternative on streamflow within the subwatershed and watersheds is minor and is not significant.

4.2.5 Alternative 5: South Pasture Extension Mine

The proposed South Pasture Extension Mine is mostly in the Horse Creek subwatershed (71% - 5,324 acres), with additional areas in the Peace River at Arcadia (24% - 1,781 acres) and Payne Creek (5% - 409 acres) subwatersheds. CF Industries proposes to initially use the CSAs and mine infrastructure corridors of the South Pasture Mine. CF Industries proposes to begin mining into this extension in 2020 (although earlier completion of the existing mine would move this date forward). The South Pasture Extension Mine anticipated schedule describes mining to continue for the first 14 to 15 years of the mine operations, and reclamation to continue to mine year 26. CF Industries anticipates beginning mining at the South Pasture Extension Mine site in 2020; therefore, mining should be complete by 2034 and reclamation should be complete by 2046.

The capture area graph for the South Pasture Extension Mine is presented in Figure 4-6. CF and reflects the gradual increase in acreage included in the recirculation system boundary over the roughly 14-year period of active mining, with a gradual return of lands to contribute to downstream flows as reclamation rates exceed the mining rates and result in a net decrease in the capture area acreages. On the basis of this analysis, the peak years of capture are predicted to occur toward the end of the period of matrix extraction, after which reclamation and land release would gradually return the full mine footprint to contributing runoff to downstream waters.

4.2.5.1 South Pasture Extension Mine Effects on Payne Creek

An analysis was not conducted for the effect of the mining of 409 acres within the Payne Creek subwatershed. The Payne Creek subwatershed is 125 square miles in size, and on a percentage basis (about 64% of total subwatershed) is already the most heavily mined subwatershed in the Lower Peace River watershed. The Payne Creek watershed is similar sized to the Joshua Creek subwatershed and apparently discharges more water during low flows than would be anticipated for a watershed of its size based on a comparison with other Peace River subwatersheds (SWFWMD, 2005; Schreuder, 2006). Because of the relative size of the South Pasture Extension Mine proposed in Payne Creek subwatershed, it is not expected that mining this relatively small percentage of the overall subwatershed would have a measurable additional effect on flows within the subwatershed.

The mining sequence indicates that for the first 20 years of mining operations, mining would occur in the Horse Creek and Peace River at Arcadia subwatersheds concurrently.

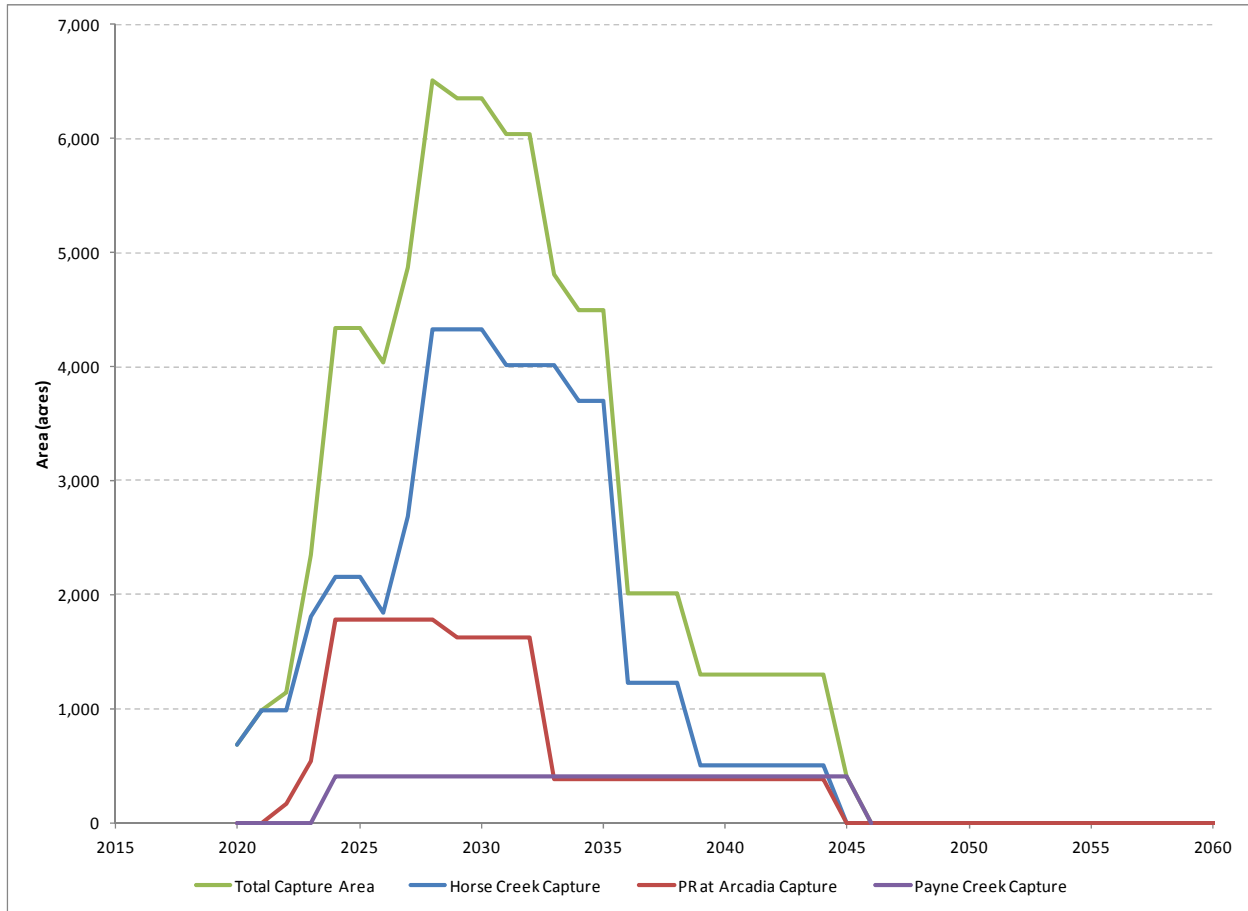


Figure 4-6. South Pasture Extension Mine Stormwater Capture Area Graph

4.2.5.2 South Pasture Extension Mine Effects on Horse Creek

Tables 4-31 and 4-32 present the annual average flows and seasonal flows calculated for Horse Creek for an average annual rainfall year with the South Pasture Extension Mine for the 100 percent and 50 percent stormwater capture, respectively. Tables 4-33 and 4-34 present the annual average flows and seasonal flows calculated for a low rainfall year for Horse Creek gage stations with the South Pasture Extension Mine for the 100 percent and 50 percent capture, respectively, for low rainfall conditions.

The largest influence on streamflow from the Horse Creek subwatershed from the mining capture areas of the South Pasture Extension Mine was predicted to show on the graphics in 2030. When considering the condition of 100 percent stormwater capture in 2030, Horse Creek may have an average annual flow of approximately 173 cfs without the South Pasture Extension Mine, and approximately 167 cfs with the South Pasture Extension Mine during average rainfall conditions. This corresponds to a decrease in flow of approximately 6 cfs, or 4 percent below the No Action Alternative conditions; and a decrease in flow of approximately 4 cfs, or 3 percent below the calculated 2009 average annual flow of 171 cfs. When considering the 50 percent stormwater capture condition, the annual average flow in Horse Creek may be approximately 170 cfs with the

- 1 South Pasture Extension Mine during average rainfall conditions. This corresponds to a decrease in flow of
 2 approximately 3 cfs, or 1 percent below the No Action Alternative conditions; and a decrease in flow of
 3 approximately 1 cfs, or less than 1 percent below the calculated 2009 average annual flow.

Table 4-31. Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 100 Percent Capture at the Horse Creek Flow Station with the South Pasture Extension Mine						
	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	171	0%	78	0%	404	0%
2020	172	0%	77	0%	411	2%
2030	167	-3%	75	-3%	401	-1%
2040	174	2%	78	1%	418	3%
2050	175	3%	79	2%	422	4%
2060	177	3%	79	2%	424	5%

4

Table 4-32. Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 50 Percent Capture at the Horse Creek Flow Station with the South Pasture Extension Mine						
	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	171	0%	78	0%	404	0%
2020	172	1%	78	0%	412	2%
2030	170	0%	76	-1%	409	1%
2040	174	2%	78	1%	418	3%
2050	175	3%	79	2%	422	4%
2060	177	3%	79	2%	424	5%

5

- 6 The same evaluation was performed for a low rainfall year. Tables 4-33 and 4-34 present the annual
 7 average flows and seasonal flows calculated for Horse Creek with the South Pasture Extension Mine for
 8 the 100 percent and 50 percent stormwater capture, respectively. When considering the condition of 100

percent capture of stormwater in the mining capture area of the South Pasture Extension Mine, Horse Creek may have an average annual flow of approximately 86 cfs without the South Pasture Extension Mine, and approximately 82 cfs with the South Pasture Extension Mine during low rainfall conditions. This corresponds to a decrease in flow of approximately 5 percent below the No Action Alternative conditions; and a decrease in flow of approximately 2 cfs, or 2 percent of the calculated 2009 average annual flow of 84 cfs. When considering the 50 percent stormwater capture condition (Table 4-34), the annual average flow in Horse Creek was reduced by a proportional percentage.

**Table 4-33. Projected Flows and Percent Change from 2009 Flows
during Low Rainfall Year and 100 Percent Capture
at the Horse Creek Flow Station with the South Pasture Extension Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	84	0%	38	0%	199	0%
2020	84	0%	38	0%	202	2%
2030	82	-2%	37	-3%	197	-1%
2040	85	2%	38	1%	205	3%
2050	86	3%	39	2%	207	4%
2060	87	3%	39	2%	209	5%

**Table 4-34. Projected Flows and Percent Change from 2009 Flows
during Low Rainfall Year and 50 Percent Capture
at the Horse Creek Flow Station with the South Pasture Extension Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	84	0%	38	0%	199	0%
2020	85	1%	38	0%	202	2%
2030	84	0%	38	-1%	201	1%
2040	86	2%	38	0%	206	3%
2050	86	3%	39	2%	207	4%
2060	87	3%	39	2%	209	5%

4.2.5.3 South Pasture Extension Mine Effects on Peace River at Arcadia

Tables 4-35 and 4-36 present the annual average flows and seasonal flows calculated for Peace River at Arcadia with the South Pasture Extension Mine for the 100 percent and 50 percent stormwater capture, respectively.

The largest influence on streamflow from the Peace River at Arcadia subwatershed from the mining capture areas of the South Pasture Extension Mine was predicted to occur around 2030. However, the impact to annual average flow from the Peace River at Arcadia subwatershed during average rainfall conditions was minimal and likely not detectable because of the small area being impacted in the Peace River at Arcadia subwatershed. When considering the condition of 100 percent capture of stormwater in the mining capture area of the South Pasture Extension Mine, Peace River at Arcadia may have an average annual flow of approximately 738 cfs without the South Pasture Extension Mine in 2030, and approximately the same flow with the South Pasture Extension Mine during average rainfall conditions in the same years. These are identical to the flows predicted for the No Action Alternative. This predicted flow is an increase in flow of approximately 25 cfs, or 3 percent above the calculated 2009 average annual flow of 713 cfs. Flow increases from the 2009 levels can be attributed to predicted changes in land uses in this subwatershed. The 50 percent capture scenario also has a negligible effect in this subwatershed.

**Table 4-35. Projected Flows and Percent Change from 2009 Flows
during Average Rainfall Year and 100 Percent Capture
at the Peace River at Arcadia Flow Station with the South Pasture Extension Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	713	0%	328	0%	1,657	0%
2020	726	2%	332	1%	1,702	3%
2030	738	3%	336	3%	1,740	5%
2040	754	6%	343	5%	1,785	8%
2050	772	8%	351	7%	1,829	10%
2060	783	10%	355	8%	1,858	12%

**Table 4-36. Projected Flows and Percent Change from 2009 Flows
during Average Rainfall Year and 50 Percent Capture
at the Peace River at Arcadia Flow Station with the South Pasture Extension Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	713	0%	328	0%	1,657	0%
2020	726	2%	332	1%	1,702	3%
2030	738	3%	336	2%	1,741	5%
2040	754	6%	343	5%	1,785	8%
2050	772	8%	351	7%	1,829	10%
2060	783	10%	355	8%	1,858	12%

- 1
- 2 The same evaluation was performed for a low rainfall year. Tables 4-37 and 4-38 present the annual
- 3 average flows and seasonal flows calculated for a low rainfall year with the South Pasture Extension Mine
- 4 for the 100 percent and 50 percent stormwater capture, respectively. Changes in flows are
- 5 indistinguishable from the No Action Alternative.

**Table 4-37. Projected Flows and Percent Change from 2009 Flows
during Low Rainfall Year and 100 Percent Capture
at the Peace River at Arcadia Flow Station with the South Pasture Extension Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	330	0%	152	0%	766	0%
2020	337	2%	154	1%	787	3%
2030	342	4%	156	3%	806	5%
2040	350	6%	159	5%	827	8%
2050	358	9%	163	7%	848	11%
2060	363	10%	165	9%	862	13%

**Table 4-38. Projected Flows and Percent Change from 2009 Flows
during Low Rainfall Year and 50 Percent Capture
at the Peace River at Arcadia Flow Station with the South Pasture Extension Mine**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	330	0%	152	0%	766	0%
2020	337	2%	154	1%	787	3%
2030	342	4%	156	3%	806	5%
2040	350	6%	159	5%	827	8%
2050	358	9%	163	7%	848	11%
2060	363	10%	165	9%	862	13%

4.2.5.4 South Pasture Extension Mine: Degree and Significance of Surface Water Resource Effects

While the flow rate from mining is projected to decrease up to 3 percent for the Horse Creek subwatershed during an average rainfall year or a low rainfall year in the dry season with a 100 percent capture area, the decrease in flow rates falls within the accuracy range for this analysis which is based on an extremely variable parameter (rainfall). The reduction in flows within Horse Creek may be indicative of a change at the Horse Creek subwatershed level; therefore, the effect cannot be considered minor. For a major effect, there must be an extended effect on surface water flows at least at the subwatershed level that also leads to a violation of the MFLs for the subwatershed. In addition to the potential reductions being within one order of significant figures, there are no SWFWMD MFLs established for Horse Creek to which the flow reduction can be compared. For this reason (no contribution to a violation of MFLs for Horse Creek and a change in stream flow rates that falls within the accuracy range), the effect on surface water flows within Horse Creek cannot be considered to have a major effect. The apparent reduction in flow is indicative of a change beyond the boundaries of the mine within the Horse Creek subwatershed even though the degree may be within the realm of natural variation. Therefore, the effects would be moderate without mitigation within the Horse Creek subwatershed but reduced to minor with mitigation. Given the moderate level of an effect for this mine within the watershed, the effect is expected to be significant without mitigation and not significant with mitigation.

Possible measures that would reduce the moderate degree of effect, mitigate the intensity factors, and potentially make the effects not significant include recharge ditches and wells to maintain base flow in Horse Creek and its tributaries, or reducing the capture area. There are also monitoring program and

other provisions in FDEP mining permits. If it is determined through monitoring that there is an unanticipated impact to the creek, the Applicants would need to address those impacts.

The effects within the Payne Creek and Peace River at Arcadia subwatersheds are minor to no effect and are not considered significant.

The individual effect of the South Pasture Extension Mine on the Peace River watershed and on Charlotte Harbor is none to minor, which is not significant. The moderate (without mitigation) degree of effect on Horse Creek and minor degree of effect on the Peace River at Arcadia and Payne Creek are overwhelmed at this scale by the contributions of other tributaries, and over time by the predicted increases in flow due to changes in land use. These effects are described further in the No Action Alternative section above (4.2.1) and in the surface water resources cumulative effects section (4.12.2).

4.2.6 Alternative 6: Pine Level/Keys Tract

The Pine Level/Keys Tract is in the Lower Myakka/Big Slough subwatershed (84% - 20,727 acres) of the Lower Myakka River watershed, the Upper Myakka River subwatershed (2% - 499 acres), and the Horse Creek subwatershed (14% - 3,484 acres). This site was identified by Mosaic as a future mine extension to the Desoto Mine; however, this mine is also a potential offsite alternative to the Applicants' Preferred Alternatives and was evaluated as an individual alternative in this section. Under cumulative impact analysis presented in Section 4.12.2, the Pine Level/Keys Tract is considered a reasonably foreseeable action. For the purpose of the description of impacts presented in this section, where the Pine Level/Keys Tract is a stand-alone alternative to the Applicants' Preferred Alternatives, this mine would require construction of an initial CSA, a beneficiation plant, and initial mine infrastructure corridors. The start date of mining was assumed to be 2025, mining would continue into mine year 32 (2057) and reclamation would continue until approximately mine year 40 (2065).

The capture area curve for the Pine Level/Keys Tract Mine site is presented in Figure 4-7 and reflects the gradual increase in acreage included in the recirculation system boundary over the roughly 32-year period of active mining, with a gradual return of lands to contribute to downstream flows as reclamation rates exceed the mining rates and result in a net decrease in the capture area acreages. On the basis of this analysis, the peak years of capture are predicted to occur toward the end of the period of matrix extraction, after which reclamation and land release would gradually return the full mine footprint to contributing runoff to downstream waters. The Lower Myakka/Big Slough subwatershed drains toward the City of North Port and Myakkahatchee Creek, which joins the Myakka River very near where it flows into Charlotte Harbor. Therefore, this mine's drainage area would not influence flows in the Myakka River except as they contribute to Charlotte Harbor (for the cumulative effect analysis in Section 4.12).

4.2.6.1 Pine Level/Keys Tract Effects on Upper Myakka River

The Pine Level/Keys Tract's potential impacts on the Upper Myakka River subwatershed were not calculated because of the very small size of the mine (approximately 499 acres) in this subwatershed. It is not expected that mining this relatively small percentage of the overall subwatershed would have a measurable effect on flows within the subwatershed.

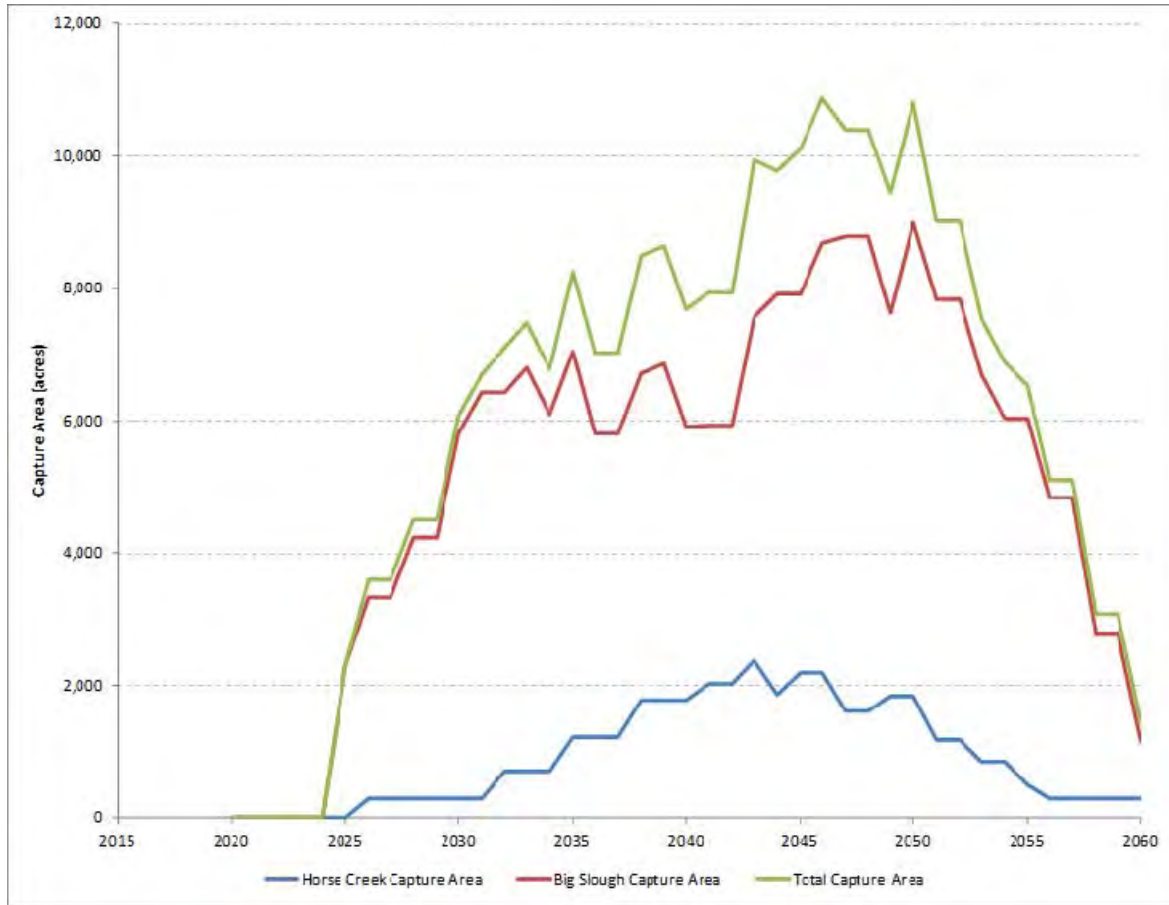


Figure 4-7. Pine Level/Keys Tract Mine Stormwater Capture Area Graph

4.2.6.2 Pine Level/Keys Tract Effects on Lower Myakka/Big Slough

Tables 4-39 and 4-40 present the annual average and seasonal flow rates calculated for an average annual rainfall for the Lower Myakka/Big Slough subwatershed with the Pine Level/Keys Tract for the 100 percent and 50 percent stormwater capture, respectively. Tables 4-41 and 4-42 present the annual average and seasonal flow rates calculated for a low annual rainfall for the Lower Myakka/Big Slough subwatershed with the Pine Level/Keys Tract for the 100 percent and 50 percent stormwater capture, respectively.

The largest influence on streamflow on the Lower Myakka/Big Slough subwatershed from the mining capture areas of the Pine Level/Keys Tract alternative was predicted to occur in approximately 2050 based on the capture graph. When considering the most conservative capture condition, 100 percent stormwater capture, the Lower Myakka/Big Slough subwatershed may have an average annual flow of approximately 217 cfs without the Pine Level/Keys Tract, and approximately 203 cfs with the Pine Level/Keys Tract during average rainfall conditions. This corresponds to a decrease in flow of approximately 14 cfs, or 6 percent below the No Action Alternative conditions as well as the calculated 2009 average annual flow of 217 cfs. When considering the 50 percent capture condition, the annual average flow from the Upper Myakka River subwatershed may be approximately 210 cfs with the Pine Level/Keys Tract during average rainfall conditions. This corresponds to a decrease in flow of approximately 7 cfs, or 3 percent below the No Action Alternative conditions as well as the calculated 2009 average annual flow. Unlike the other alternatives studied, there is no change in the annual flow rates predicted over time in Lower Myakka/Big Slough in this analysis because, unlike the other subwatersheds, there were no resulting changes to future land use. There was no projected increase in urbanization or other mines that would be reclaimed in the upper reaches of the subwatershed. As the mines are reclaimed, the flows return to near pre-mining conditions.

**Table 4-39. Projected Flows and Percent Change from 2009 Flows
during Average Rainfall Year and 100 Percent Capture
in Lower Myakka/Big Slough Watershed with the Pine Level/Keys Tract**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	217	0%	117	0%	629	0%
2020	217	0%	117	0%	629	0%
2030	206	-5%	111	-5%	596	-5%
2040	207	-5%	111	-5%	599	-5%
2050	203	-6%	109	-7%	589	-6%
2060	215	-1%	116	-1%	623	-1%

**Table 4-40. Projected Flows and Percent Change from 2009 Flows
during Average Rainfall Year and 50 Percent Capture
in Lower Myakka/Big Slough Subwatershed with the Pine Level/Keys Tract**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	217	0%	117	0%	629	0%
2020	217	0%	117	0%	629	0%
2030	212	-3%	114	-3%	614	-3%
2040	212	-2%	113	-3%	609	-2%
2050	210	-3%	112	-4%	601	-3%
2060	216	<-1%	116	<-1%	626	<-1%

The same evaluation was performed for a low rainfall year with similar results. Table 4-41 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 100 percent capture of stormwater in the capture area of the Pine Level/Keys Tract. Table 4-42 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 50 percent capture of stormwater in the capture area of the Pine Level/Keys Tract. The maximum influence is predicted to occur in approximately 2050 based on the capture analysis. When considering the condition of 100 percent capture of stormwater in the mining capture area of the Pine Level/Keys Tract Mine, Lower Myakka/Big Slough may have an average annual flow of approximately 176 cfs without the Pine Level/Keys Tract Mine, and approximately 165 cfs with the Pine Level/Keys Tract during low rainfall conditions. This corresponds to a decrease by approximately 6 percent by 2050 from the No Action Alternative. When considering the 50 percent stormwater capture condition (Table 4-42), the annual average flow decreases by approximately 2 percent by 2050, less than half of the 100 percent capture scenario from the No Action Alternative or from the 2009 levels.

**Table 4-41. Projected Flows and Percent Change from 2009 Flows
during Low Rainfall Year and 100 Percent Capture
in Lower Myakka/Big Slough Subwatershed with the Pine Level/Keys Tract**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	176	0%	95	0%	511	0%
2020	176	0%	95	0%	511	0%
2030	167	-5%	90	-5%	484	-5%
2040	168	-5%	90	-5%	486	-5%
2050	165	-6%	89	-7%	478	-6%
2060	175	-1%	94	-1%	506	-1%

1

**Table 4-42. Projected Flows and Percent Change from 2009 Flows
during Low Rainfall Year and 50 Percent
Lower Myakka/Big Slough Subwatershed with the Pine Level/Keys Tract**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	176	0%	95	0%	511	0%
2020	176	0%	95	0%	511	0%
2030	172	-3%	92	-3%	497	-3%
2040	172	-2%	92	-2%	498	-2%
2050	169	-4%	91	-3%	494	-3%
2060	175	-1%	94	<-1%	508	<-1%

2

4.2.6.3 Pine Level/Keys Tract Effect on Horse Creek

Tables 4-43 and 4-44 present the annual average flows and seasonal flows calculated for an average rainfall year with the Pine Level/Keys Tract for the 100 percent and 50 percent stormwater capture, respectively. The largest influence on streamflow on the Horse Creek subwatershed from the mining capture areas of the Pine Level/Keys Tract alternative was predicted to occur between 2040 and 2050 based on the capture graph. When considering the condition of 100 percent stormwater capture between 2040 and 2050, Horse Creek may have an average annual flow of approximately 174 cfs without the Pine

Level/Keys Tract, and approximately 173 cfs with the Pine Level/Keys Tract during average rainfall conditions. This corresponds to a decrease in flow of approximately 1 cfs, or less than 1 percent below the No Action Alternative conditions; and an increase in flow of approximately 2 cfs, or 1 percent above the calculated 2009 average annual flow of 171 cfs. Flow increases from the 2009 levels can be attributed to predicted changes in land uses in this subwatershed. The 50 percent capture scenario also has a negligible effect in this subwatershed.

**Table 4-43. Projected Flows and Percent Change from 2009 Flows
during Average Rainfall Year and 100 Percent Capture
in Horse Creek with the Pine Level/Keys Tract**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	171	0%	78	0%	404	0%
2020	173	1%	78	0%	413	2%
2030	173	1%	78	0%	416	3%
2040	172	1%	77	<1%	414	2%
2050	173	1%	78	0%	417	3%
2060	176	3%	79	2%	424	5%

**Table 4-44. Projected Flows and Percent Change from 2009 Flows
during Average Rainfall Year and 50 Percent
Capture in Horse Creek with the Pine Level/Keys Tract**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	171	0%	78	0%	404	0%
2020	173	1%	78	0%	413	2%
2030	173	1%	78	0%	416	3%
2040	173	1%	78	0%	417	3%
2050	174	2%	78	<1%	419	4%
2060	176	3%	79	2%	424	5%

- 1 The same evaluation was performed for a low rainfall year. Tables 4-45 and 4-46 present the annual
 2 average flows and seasonal flows calculated for a low rainfall year with the Pine Level/Keys Tract for the
 3 100 percent and 50 percent stormwater capture, respectively. Changes in flows are insignificantly
 4 different from the No Action Alternative (1 cfs or less).

**Table 4-45. Projected Flows and Percent Change from 2009 Flows
 during Low Rainfall Year and 100 Percent Capture
 in Horse Creek with the Pine Level/Keys Tract**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	84	0%	38	0%	199	0%
2020	85	1%	38	0%	203	2%
2030	85	1%	38	0%	204	3%
2040	85	1%	38	0%	204	2%
2050	85	1%	38	0%	205	3%
2060	87	3%	39	2%	208	5%

**Table 4-46. Projected Flows and Percent Change from 2009 Flows
 during Low Rainfall Year and 50 Percent
 in Horse Creek with the Pine Level/Keys Tract**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	84	0%	38	0%	199	0%
2020	85	1%	38	0%	203	2%
2030	85	1%	38	0%	204	3%
2040	85	1%	38	0%	205	3%
2050	86	2%	39	1%	206	4%
2060	87	3%	39	2%	208	5%

4.2.6.4 Pine Level/Keys Tract: Degree and Significance of Surface Water Resource Effects

Within the Lower Myakka/Big Slough subwatershed, while the flow rate from mining is projected to decrease up to 7 percent in 2050 during the dry seasonal flow with a 100 percent capture area regardless

of the rainfall levels, the decrease in flow rates falls within the error range for this analysis which is based on an extremely variable parameter (rainfall). The reduction in flows within Lower Myakka/Big Slough subwatershed may be indicative of a change at the Lower Myakka/Big Slough subwatershed level; therefore, the effect cannot be considered minor. For a major effect, there must be an extended effect on surface water flows at least at the subwatershed level that also leads to a violation of the MFLs for the subwatershed. In addition to the potential reductions being within one order of significant figures, there are no SWFWMD MFLs established for Lower Myakka/Big Slough subwatershed to which flow reductions can be compared. For this reason (no contribution to a violation of MFLs for Lower Myakka/Big Slough and a change in stream flow rates that falls within the expected error range), the effect on surface water flows within Lower Myakka/Big Slough subwatershed cannot be considered to have a major effect. The apparent reduction in flow is indicative of a change beyond the boundaries of the mine within the Lower Myakka/Big Slough subwatershed even though the degree may be within the realm of natural variation. Therefore, the effects would be moderate without mitigation within the Lower Myakka/Big Slough subwatershed. Given the moderate level of an effect for this mine within the watershed, the effect is expected to be significant.

For the Horse Creek subwatershed, the maximum predicted impacts on flow rate from mining are decreases of less than 1 percent in 2040 during the dry seasonal flow in an average rainfall year with a 100 percent capture area, and less than 1 percent in 2050 during the dry seasonal flow in an average rainfall year with a 50 percent capture area. Flow increases from the 2009 levels predicted at the end of the temporal scope of the analysis can be attributed to predicted changes in land uses in this subwatershed and they exceed reductions predicted for this alternative's impact in Horse Creek. Although measurable, the adverse effects are at a very low level, and therefore are determined to be minor and not significant.

The effect within the Upper Myakka subwatershed is a minor to no effect and is not considered significant. The individual effect of mining the Pine Level/Keys Tract on the Myakka River and Peace River watersheds and on Charlotte Harbor is none to minor, which is not significant. The moderate (without mitigation) degree of effect on Lower Myakka/Big Slough and Horse Creek and minor degree of effect on the Upper Myakka River are overwhelmed at this scale by the contributions of other tributaries, and over time by the predicted increases in flow due to changes in land use. These effects are described further in the No Action Alternative section above (4.2.1) and in the surface water resources cumulative effects section (Section 4.12.2).

Possible measures that would reduce the moderate degree of effect, mitigate the intensity factors, and potentially make the effects not significant include recharge ditches and wells to maintain base flow in the Lower Myakka/Big Slough and Horse Creek subwatersheds and their tributaries, or reducing the capture area within the two subwatersheds. There are also monitoring programs and other provisions in FDEP

mining permits. If it were determined through monitoring that there were unanticipated impacts in either subwatershed, the Applicants would need to address those impacts.

4.2.7 Alternative 7: Pioneer Tract

The Pioneer Tract is in the Horse Creek subwatershed (43% - 10,824 acres) and the Peace River at Arcadia subwatershed (57% - 14,426 acres). This site was identified by Mosaic as a future mine extension to the Ona Mine; however, this mine is also a reasonable alternative to the Applicants' Preferred Alternatives and will be evaluated as an individual alternative in this section. Under cumulative impact analysis presented in Section 4.12, the Pioneer Tract is considered a reasonably foreseeable action. For the purpose of the description of impacts presented in this section, where the Pioneer Tract is a standalone alternative to the Applicants' Preferred Alternatives, this mine would require construction of an initial CSA, a beneficiation plant, and initial mine infrastructure corridors. The start date of mining was assumed to be 2025, mining would continue into mine year 32 (2057) and reclamation would continue until approximately mine year 40 (2065).

The capture area curve for the Pioneer Tract Mine site is presented In Figure 4-8 and reflects the gradual increase in acreage included in the recirculation system boundary over the roughly 32-year period of active mining, with a gradual return of lands to contribute to downstream flows as reclamation rates exceed the mining rates and result in a net decrease in the capture area acreages. As with the previous alternatives where the footprint lies in different subwatersheds, the analysis provides the results by subwatershed. The impacts of this alternative on surface water runoff potential were calculated by evaluating the change to the runoff coefficients in the Horse Creek and the Peace River at Arcadia subwatersheds. On the basis of this analysis, the peak years of capture are predicted to occur toward the end of the period of matrix extraction, after which reclamation and land release would gradually return the full mine footprint to contributing runoff to downstream waters.

4.2.7.1 Pioneer Tract Effects on Horse Creek

Tables 4-47 and 4-48 present the annual average and seasonal flow rates calculated for Horse Creek with Pioneer Mine for an average rainfall year for the 100 percent and 50 percent stormwater capture, respectively. Tables 4-49 and 4-50 present the annual average and seasonal flow rates calculated for Horse Creek with Pioneer Mine for a low rainfall year for the 100 percent and 50 percent stormwater capture, respectively.

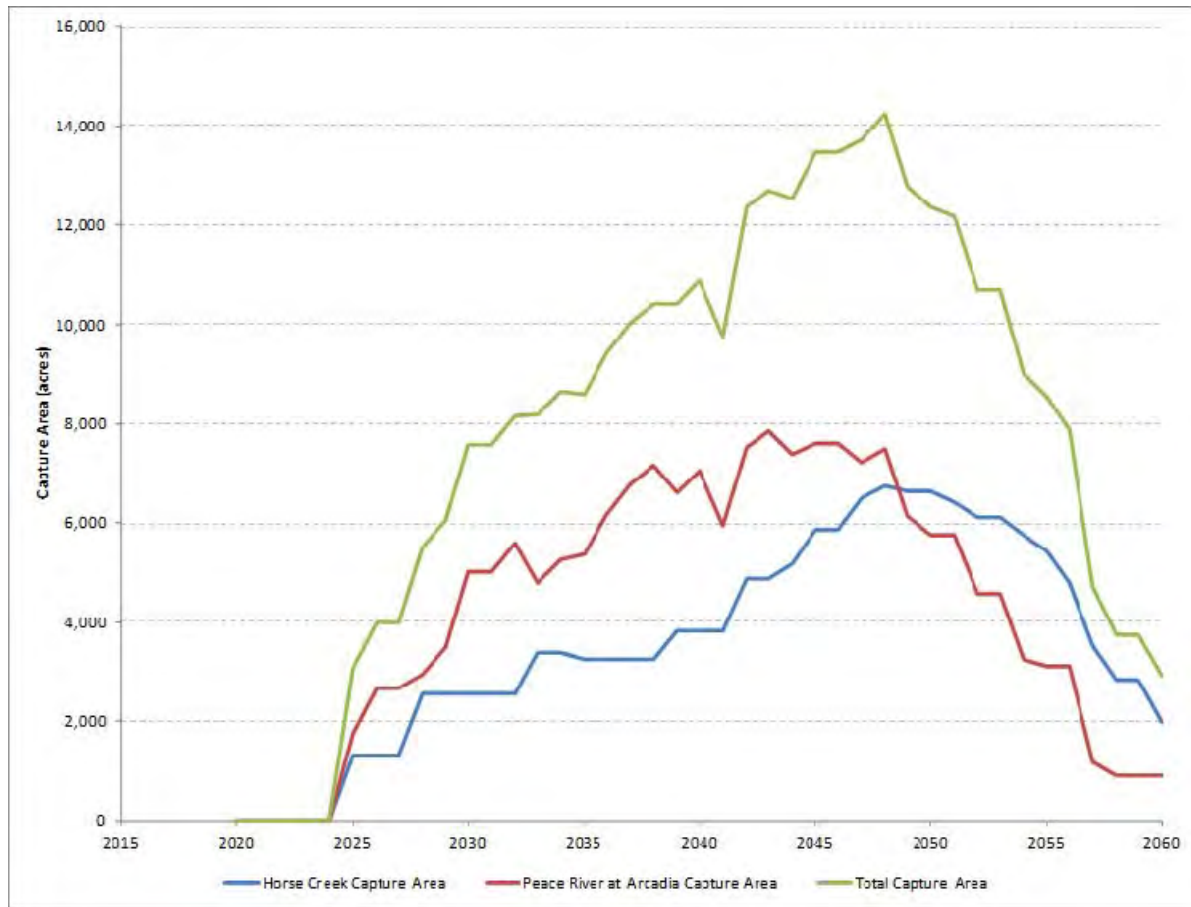


Figure 4-8. Stormwater Capture Area Graph for a Conceptual Pioneer Tract

Table 4-47. Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 100 Percent Capture at the Horse Creek Flow Station with the Pioneer Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	171	0%	78	0%	404	0%
2020	173	1%	78	0%	413	2%
2030	170	-1%	76	-2%	408	1%
2040	169	-1%	76	-2%	407	1%
2050	165	-3%	74	-4%	400	-1%
2060	174	2%	78	1%	418	3%

**Table 4-48. Projected Flows and Percent Change from 2009 Flows
during Average Rainfall Year and 50 Percent Capture
at the Horse Creek Flow Station with the Pioneer Tract**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	171	0%	78	0%	404	0%
2020	173	1%	78	0%	413	2%
2030	172	<1%	77	-1%	412	2%
2040	172	1%	77	-1%	413	2%
2050	171	0%	77	-1%	411	2%
2060	175	2%	79	1%	421	4%

1

**Table 4-49. Projected Flows and Percent Change from 2009 Flows
during Low Rainfall Year and 100 Percent Capture
at the Horse Creek Flow Station with the Pioneer Tract**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	84	0%	38	0%	199	0%
2020	85	1%	38	0%	203	2%
2030	83	-1%	38	-2%	201	1%
2040	83	-1%	37	-2%	200	1%
2050	82	-3%	37	-4%	197	-1%
2060	85	2%	38	1%	205	3%

2

3

**Table 4-50. Projected Flows and Percent Change from 2009 Flows
during Low Rainfall Year and 50 Percent Capture
at the Horse Creek Flow Station with the Pioneer Tract**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	84	0%	38	0%	199	0%
2020	85	1%	38	0%	203	2%
2030	84	0%	38	<-1%	203	2%
2040	84	<1%	38	<-1%	203	2%
2050	84	0%	38	<-1%	202	2%
2060	86	2%	39	1%	207	4%

The largest influence on streamflow from the Horse Creek subwatershed from the mining capture areas of the Pioneer Tract in the Horse Creek subwatershed was predicted to occur in approximately 2050 based on the capture graph. When considering the most conservative runoff capture condition, 100 percent stormwater capture, in 2050 Horse Creek may have an average annual flow of approximately 175 cfs without the Pioneer Tract, and approximately 165 cfs with the Pioneer Tract during average rainfall conditions. This corresponds to a decrease in flow of approximately 10 cfs, or 6 percent below the No Action Alternative conditions; and a decrease in flow of approximately 6 cfs, or 3 percent below the calculated 2009 average annual flow of 171 cfs. When considering the 50 percent stormwater capture condition, the annual average flow in Horse Creek may be approximately 171 cfs with the Pioneer Tract during average rainfall conditions. This corresponds to a decrease in flow of approximately 4 cfs, or 2 percent below the No Action Alternative conditions; and about the same flow as the calculated 2009 average annual flow. Flow increases from the 2009 levels can be attributed to predicted changes in land uses in areas of this subwatershed. Flow is expected to return to near No Action Alternative conditions by 2060 and is slightly higher than 2009 flow because changes to land use outweigh the effects of mining.

The same evaluation was performed for a low rainfall year. Tables 4-49 and 4-50 present the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 100 and 50 percent capture of stormwater in the capture area of the Pioneer Tract at the Horse Creek flow station, respectively. Similar to the average rainfall conditions evaluation, annual average flow does not change by much. The average annual flow for the 100 percent capture scenario with an average annual rainfall decreases by approximately 3 percent by 2050 when compared to 2009 flows. The flows recover after 2050 to a level that is higher than the 2009 levels resulting from land use change. All differences in this

case are only a few cfs. Considering the low rainfall year with a capture area of 50 percent and the changes are negligible.

4.2.7.2 Pioneer Tract Effects on Peace River at Arcadia

Tables 4-51 and 4-52 present the annual average flows and seasonal flow rates calculated in an average rainfall year for Peace River at Arcadia gage stations with the Desoto Mine for the 100 percent and 50 percent stormwater capture, respectively. Tables 4-53 and 4-54 present the annual average flows and seasonal flow rates calculated in a low rainfall year for Peace River at Arcadia gage stations with the Desoto Mine for the 100 percent and 50 percent stormwater capture, respectively.

The largest influence on streamflow from the Peace River at Arcadia subwatershed from the mining capture areas of the Pioneer Tract was predicted to occur on 2040. When considering the condition of 100 percent stormwater capture, Peace River at Arcadia may have an average annual flow of approximately 754 cfs without the Pioneer Tract in 2040, and approximately 749 cfs with the Pioneer Tract during average rainfall conditions in the same year (Table 4-36). This corresponds to a decrease in flow of approximately 5 cfs, or less than 1 percent below the No Action Alternative conditions; and an increase in flow of approximately 36 cfs, or 5 percent above the calculated 2009 average annual flow. When considering the 50 percent stormwater capture condition, the results are very similar to those estimated under the 100 percent capture conditions (Table 4-37). The impact to annual average flow from the Peace River at Arcadia subwatershed during average rainfall conditions was minimal and likely not detectable because although the acreage of the mining (over 14,000 acres) within the subwatershed is large, a comparatively small area of the subwatershed is impacted and the flow within the subwatershed is high. Comparing this mine to the Desoto Mine in the Horse Creek subwatershed illustrates that point. The Desoto Mine has a similar acreage (15,993 versus 14,426), while the subwatershed flow in the Horse Creek is 171 cfs compared to 713 cfs for Peace River at Arcadia based on the 2009 levels, yet the Desoto Mine had no more than about a 9 cfs change. Based on land use changes within the subwatershed and upstream subwatersheds, flows are predicted to increase during the Pioneer Tract mining period in excess of the effect observed by mining.

**Table 4-51. Projected Flows and Percent Change from 2009 Flows
during Average Rainfall Year and 100 Percent Capture
at the Peace River at Arcadia Flow Station with the Pioneer Tract**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	713	0%	328	0%	1,657	0%
2020	726	2%	332	1%	1,702	3%
2030	734	3%	334	2%	1,734	5%
2040	749	5%	340	4%	1,773	7%
2050	768	8%	348	6%	1,818	10%
2060	782	10%	355	8%	1,856	12%

1

**Table 4-52. Projected Flows and Percent Change from 2009 Flows
during Average Rainfall Year and 50 Percent Capture
at the Peace River at Arcadia Flow Station with the Pioneer Tract**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	713	0%	328	0%	1,657	0%
2020	726	2%	332	1%	1,702	3%
2030	736	3%	335	2%	1,738	5%
2040	752	5%	341	4%	1,779	7%
2050	770	8%	349	7%	1,824	10%
2060	783	10%	355	8%	1,857	12%

2

3 The same evaluation was performed for a low rainfall year. Flows are predicted to decrease by less than
4 one percent from the No Action Alternative by 2040. Annual average flow increases by approximately 5
5 percent by 2040 from 2009 levels. Under the 50 percent capture scenario, the difference from the 100
6 percent results is inconsequential.

**Table 4-53. Projected Flows and Percent Change from 2009 Flows
during Low Rainfall Year and 100 Percent Capture
at the Peace River at Arcadia Flow Station with the Pioneer Tract**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	330	0%	152	0%	766	0%
2020	337	2%	154	1%	787	3%
2030	340	3%	155	2%	803	5%
2040	347	5%	158	4%	822	7%
2050	357	8%	162	7%	845	10%
2060	363	10%	165	8%	861	12%

1

**Table 4-54. Projected Flows and Percent Change from 2009 Flows
during Low Rainfall Year and 50 Percent Capture
at the Peace River at Arcadia Flow Station with the Pioneer Tract**

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	330	0%	152	0%	766	0%
2020	337	2%	154	1%	787	3%
2030	341	3%	155	2%	805	5%
2040	349	6%	158	4%	825	8%
2050	358	8%	162	7%	846	11%
2060	363	10%	165	9%	861	12%

2

4.2.7.3 Pioneer Tract: Degree and Significance of Surface Water Resource Effects

While the flow rate from mining in the Horse Creek subwatershed is projected to decrease up to 4 percent in 2050 from the seasonal dry flows with a 100 percent capture area for the average annual rainfall, the decrease in flow rates falls within the error range for this analysis which is based on an extremely variable parameter (rainfall). The reduction in flows within Horse Creek may be indicative of a change at the Horse Creek subwatershed level; therefore, the effect cannot be considered minor. For a major effect, there

must be an extended effect on surface water flows at least at the subwatershed level that also leads to a violation of the MFLs for the subwatershed. In addition to the potential reductions being within one order of significant figures, there are no SWFWMD MFLs established for Horse Creek to which flow reductions can be compared. For this reason (no contribution to a violation of MFLs for Horse Creek and a change in stream flow rates that falls within the expected error range), the effect on surface water flows within Horse Creek cannot be considered to have a major effect. The apparent reduction in flow is indicative of a change beyond the boundaries of the mine within the Horse Creek subwatershed even though the degree may be within the realm of natural variation. Therefore, the effects would be moderate without mitigation within the Horse Creek subwatershed and minor with mitigation. Given the moderate level of an effect for this mine within the watershed, the effect is expected to be significant without mitigation but not significant with mitigation.

Possible measures that would reduce the moderate degree of effect, mitigate the intensity factors, and potentially make the effects not significant include recharge ditches and wells to maintain base flow in Horse Creek and its tributaries, or reducing the capture area. There are also monitoring program and other provisions in FDEP mining permits. If it is determined through monitoring that there is an unanticipated impact to the creek, the Applicants would need to address those impacts.

The effects within the Peace River at Arcadia subwatershed are minor to no effect and are not considered significant.

The individual effect of mining the Pioneer Tract on the Peace River watershed and on Charlotte Harbor is none to minor, which is not significant. The moderate (without mitigation) degree of effect on Horse Creek and minor degree of effect on the Peace River at Arcadia are overwhelmed at this scale by the contributions of other tributaries, and over time by the predicted increases in flow due to changes in land use. These effects are described further in the No Action Alternative section above (4.2.1) and in the surface water resources cumulative effects section (Section 4.12.2).

4.2.8 Alternative 8: Site A-2

Approximately 8,125 acres of Site A-2 is mapped within the Peace River at Zolfo Springs subwatershed. An additional 64 acres is mapped within the Charlie Creek subwatershed. The area mapped within the Charlie Creek subwatershed may be attributed to mapping inaccuracy, so the entire parcel will be considered within the Peace River at Zolfo Springs subwatershed. This section qualitatively describes the potential impact associated with mining Site A-2, based on the parcel having conditions affecting surface water contributions that are similar to those existing on the other offsite alternative parcels. No applicant has proposed mining Site A-2, and therefore there is not enough information available to perform a quantitative analysis.

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Appendix C:

Replacement Pages for Appendix J

Impact Evaluation Methods for the Final AEIS on Phosphate Mining in the CFPD

PREPARED FOR: U.S. Army Corps of Engineers, Jacksonville District

COPY TO: U.S. Environmental Protection Agency
Florida Department of Environmental Protection

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DATE: April 9, 2013; revised June 25, 2013

PROJECT NUMBER: 418237.09.01

1.0 Introduction

Impact evaluations for each of the alternatives were often performed using publically available geographic information system (GIS) databases and supplementary data from the four applications for the Applicants' Preferred Alternatives plus the four offsite alternatives. Mosaic also provided some additional information about the Pine Level/Keys and Pioneer offsite alternatives. Relevant literature and information provided by the public during the scoping and Draft Areawide Environmental Impact Statement (DAEIS) comment periods further added to the database. Additional evaluations that went beyond GIS review, as described in the following sections, were performed for surface water resources, groundwater resources, ecological resources (including fish and wildlife habitats), and economic resources. Offsite alternatives were part of the evaluation, but because of the lack of site-specific, ground-truthed information about these sites and a lack of site-specific mine plans for these alternatives, their impact on resources was largely inferred based on current mining practices and proposed mining operations for the Applicants' Preferred Alternatives. The offsite alternatives A-2 and W-2 were the most speculative of the four offsite alternatives and had even less available data, which further limited the evaluation for some resource categories.

2.0 Surface Water Quantity Evaluation Methods

Evaluation of the potential effects of phosphate mining alternatives on surface water resources within the AEIS study area focused on addressing concerns that the expansion of mining could result in reduced quantities and quality of surface water to downstream reaches of streams and rivers, and to the Charlotte Harbor estuary. Reduced surface water flow and/or quality caused by a single mine or as a cumulative impact from multiple activities, including mining as well as other water users, could result in impacts to downstream aquatic biological communities, wildlife habitat, listed species, wetlands, recreational activities, or public water supplies. This section describes the methods used to assess the surface water quantity, while the next section describes water quality analysis methods.

The surface water quantity evaluation for the Final AEIS included modifications to address public comments, although the overall methodology to predict surface water flow from the landscape was similar in the Draft and Final AEIS. The stormwater capture curves were mostly the same in both analyses with minor adjustment of the Pine Level/Keys Tract boundary provided by Mosaic as a GIS shape file after publishing the Draft AEIS. The capture curves were adjusted to better align with subwatershed boundaries. The runoff coefficient approach was retained to estimate seasonal surface water delivery from the subwatersheds, but projected land uses in previously mined areas (extractive land use) that had been modified provided a better assessment of the impacts from reclamation and release of the existing mines.

Evaluations added to the Final AEIS to address comments on the Draft AEIS included an analysis of 50 percent capture of stormwater on active mined lands. This additional analysis provides an evaluation of average capture rates that are closer to information available from the Applicants' water use permit (WUP) applications. This 50 percent capture scenario is still very conservative but the 100 percent scenario evaluated in the Draft AEIS was

also retained to provide an even more conservative bounding analysis approach. Surface water computations and results were updated to incorporate these changes.

New excess precipitation (Excess P) computations for active mine blocks were developed for the Final AEIS with the new 50 percent capture scenario for the Desoto, Ona, and South Pasture Extension alternatives. This 50 percent capture analysis was used in the groundwater modeling to determine the recharge rates at the Applicants' Preferred Alternatives. The results of the Excess P calculations compared well to the runoff coefficient approach results for the average annual rainfall.

A new low-flow analysis near the existing Peace River/Manasota Regional Water Supply Authority (PRMRWSA) intake was added to perform a bounding analysis of potential surface water supply impacts. However, there were insufficient data to conduct a comparable assessment at the City of North Port's intake location. In addition, this Final AEIS includes more definitions, assumptions, and explanations in Chapter 4 and Appendix G to address public comments and to add clarification to the document.

Information on the proposed durations and schedules of mining were available for each of the four Applicants' Preferred Alternatives: Desoto Mine, Ona Mine, Wingate East Mine, and South Pasture Mine Extension. Two of the four offsite alternatives (Pine Level/Keys Tract and Pioneer Tract) were considered reasonably foreseeable and likely to occur in the timeframe of the AEIS, based on their being likely extensions of the Desoto and Ona Mines, respectively. Therefore, conceptual mine plans were prepared for these two offsite alternatives based on information on site boundaries provided by Mosaic and assumptions based on other similarly sized mines for which mine plans were available. In considering these two offsite alternatives as independent mines to either of the Applicants' Preferred Alternatives, the scheduled implementation of these offsite alternatives would be moved up in time but the magnitude of their impact on surface water flow would be similar to that indicated by their evaluation as extensions to other mines.

The other two offsite alternatives (Sites A-2 and W-2) are more speculative since there has been no apparent interest by the Applicants to date in their future use. As a result, mine plans and site-specific information on potential mining activities are not available for these alternatives. Additional details on potential mining activities would be required before site-specific impact analyses could be completed. Therefore, rather than perform detailed modeling analyses, evaluations of these additional offsite alternatives are based on extrapolation, applying results from other analyses to the extent practical, using information on the size of the site, its location, existing land use, and other readily available information.

The temporal scope of the direct and indirect impacts analysis for each alternative is for the life of the mine operations, including reclamation, or through 2060. The Pine Level/Keys and Pioneer Tracts are considered both as individual mines as well as extensions to other mines under a cumulative impact analysis. The timeframe for these mines vary in each case: as an independent mine alternative, it is assumed they would start in 2025 and extend to about 2060; as extensions to other alternative mines, they would start after these host mines closed and extend beyond the year 2060. But no analyses are considered beyond a 50-year timeframe since the mines included under the Applicants' Preferred Alternatives would all be closed by that date.

The locations of the Applicants' Preferred Alternatives in relation to the Peace River and Myakka River watersheds and specific subwatersheds within the overall river watersheds are shown in Figures 1 and 2. Of the four Applicants' Preferred Alternatives, three are primarily in the Horse Creek subwatershed, with smaller areas in the Peace River at Arcadia subwatershed (Desoto Mine, Ona Mine, and South Pasture Mine Extension) and one (Wingate East Mine) is primarily in the Upper Myakka River subwatershed. One of the four offsite alternatives (Pioneer Tract) is similarly aligned within the Horse Creek and Peace River at Arcadia subwatersheds (about equally split between them), and a second (Pine Level/Keys Tract) is primarily in the Big Slough subwatershed in the Lower Myakka River subwatershed with a fraction located in Horse Creek. Because the Big Slough Basin is the only waterbody in the Lower Myakka River subwatershed affected by any of the alternatives considered, these are treated together as the Big Slough/Lower Myakka Subwatershed.

FIGURE 1

Location of the Alternatives in Relation to Peace River Subwatersheds

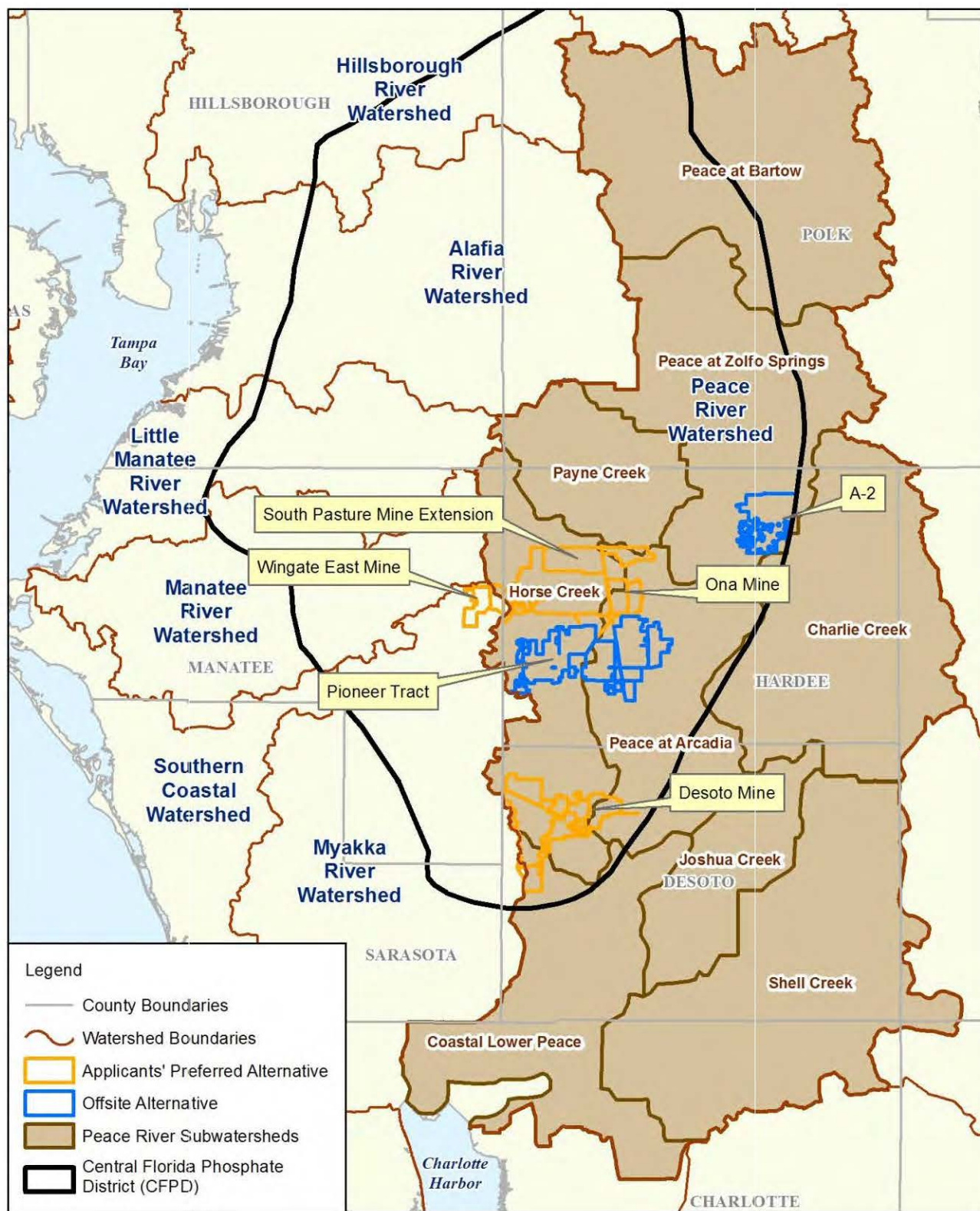
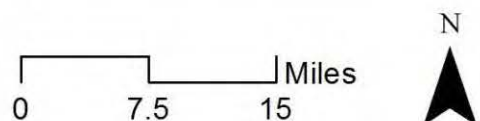
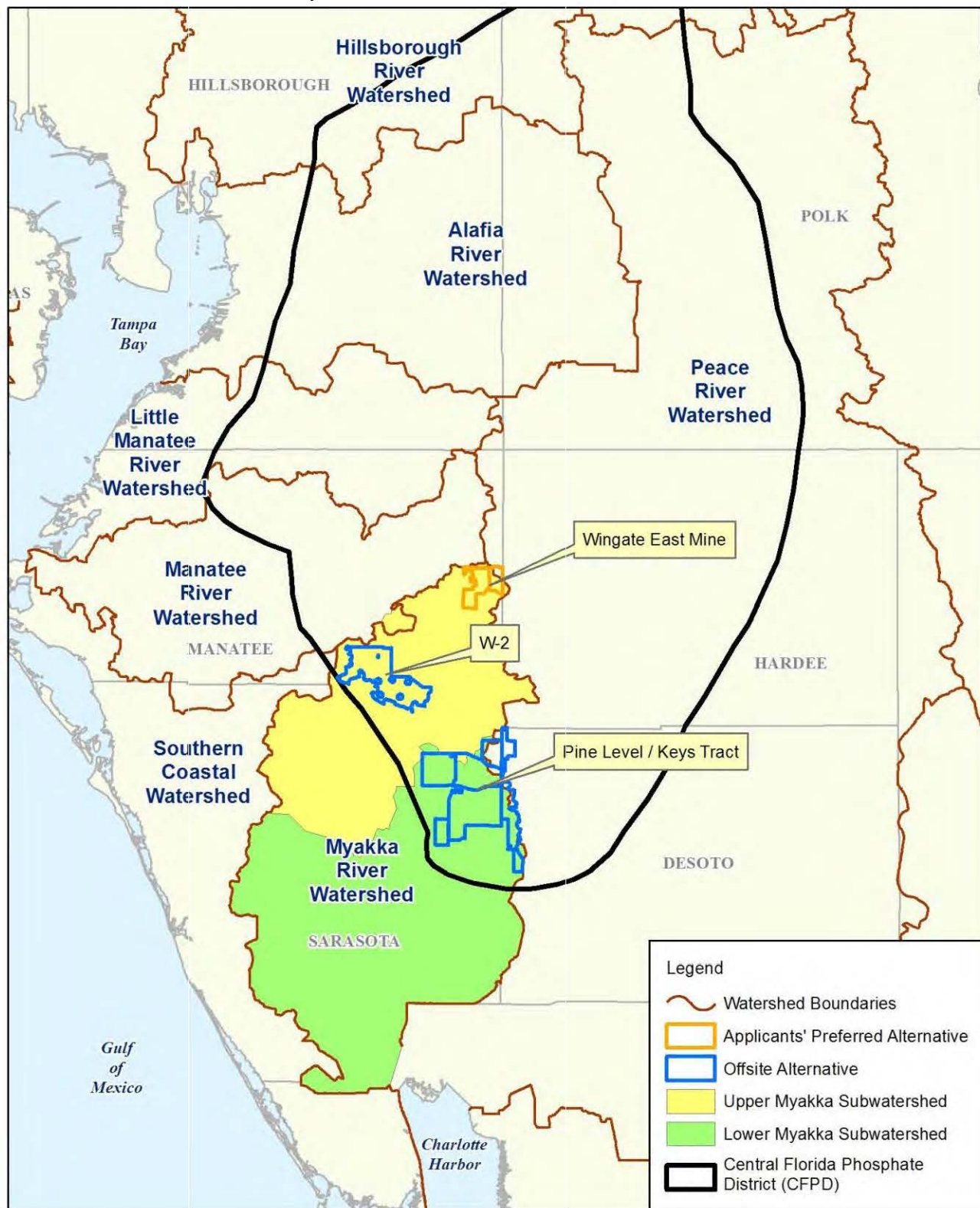


FIGURE 2

Location of the Alternatives in the Myakka River Subwatersheds



Accordingly, this surface water hydrologic analysis primarily focused on these three specific subwatersheds (Horse Creek and Peace River at Arcadia in the Peace River watershed and the Big Slough/Lower Myakka in the Myakka River watershed) within the AEIS study area, and subsequently to Charlotte Harbor estuary. The other two offsite alternatives are in the Peace River at Zolfo Springs (Site A-2) and the Upper Myakka River (Site W-2) subwatersheds. As discussed previously, analyses of these two offsite alternatives were qualitatively conducted for surface water direct and indirect impacts. Some of the alternatives also had smaller areas overlapping the subwatershed boundaries as defined by federal water resource agencies (U.S. Geological Survey [USGS] and U.S. Department of Agriculture [USDA]), and these are addressed as appropriate. The subwatershed boundaries and alternative boundaries do not always coincide in the GIS database. Furthermore, the landscapes at the upland boundaries are typically flat and some historic flow paths have been altered by ditching. This leaves some portions around the subwatershed boundary uncertain as to where runoff may flow. Very small areas and some larger areas, which are identified in the analysis, were considered insignificant because it was determined that the expected impact of an area of 500 acres or less would be less than 1 cubic foot per second (cfs) on an average annual basis. All flows were rounded to the nearest cfs, so small changes in flow would not be significant at the subwatershed scale.

During the ore extraction phase of phosphate mining (i.e., active mining), much of the direct rainfall on a given mine area is captured and held within a mine's recirculation system, consisting of a network of open-channel ditches and canals, clay settling area (CSA) impoundments, and a network of pipelines used for conveyance of water, matrix, sand, and clay slurries. Following capture, the stormwater is used and reused to support these conveyances and other onsite treatment and mitigation functions, with excess rainfall being released through National Pollutant Discharge Elimination System (NPDES) permitted outfalls or seeped into the surrounding surficial aquifer system (SAS) to hydrate adjacent wetlands and streams. For the AEIS, the direct impact of capturing the stormwater onsite at proposed mines was represented by capture area curves (area of mine included in the recirculation system at any given time). The reuse of onsite stormwater was a recommendation by the U.S. Environmental Protection Agency (USEPA) in their 1978 EIS for the phosphate industry as a way of reducing groundwater withdrawals (USEPA, 1978b).

The offsite, indirect impacts required a reasonable quantification of the potential reductions in offsite flow rates during active mining to evaluate the reduction of runoff to downstream resources that may occur on a long-term average basis. Following reclamation and the release of blocks of land from the control systems, the reclaimed land use responds hydrologically closer to pre-mining conditions (see Appendix G). The following section includes a description of the evaluation method and assumptions used in the AEIS for surface water flow estimates.

The AEIS had to support detailed assessment of the potential impacts on net downstream water deliveries for the subwatersheds affected by the Applicants' Preferred Alternatives and the offsite alternatives in various stages of mining and reclamation and for the overall river watersheds far into the future. The surface water effect of the No Action Alternative also had to be assessed. The methodology applied to assess surface water runoff changes had to meet the following goals:

- Account for runoff differences between different soils and land uses
- Support analysis of affected subwatersheds as well as the overall river watersheds where the subject mines are located
- Account for a seasonal component since central Florida has distinct dry and wet seasons
- Account for changes in land use, including mining, far into the future (to 2060) with reasonable accuracy and sensitivity

A review of available methods and computer models is provided in Appendix G. In summary, no detailed hydrologic computer simulation models have been developed for the entire study area that could be readily applied without significant expense and lengthy work. Detailed hydrologic computer modeling of short-term relationships was not viewed as an appropriate technical approach to support the AEIS evaluations. Rather, a

simpler method was used that would provide long-range predictions that account for changes in land use over time both within the mine footprint as well as for the subwatersheds where the mines are located.

2.1 Runoff Calculation Method Overview

The approach adopted to estimate the offsite surface water delivery is based on the one used for a recent analysis of pollutant loading to the Charlotte Harbor estuary performed on behalf of the Charlotte Harbor National Estuary Program (CHNEP) by Janicki (2010). The evaluations conducted for the CHNEP coupled the hydraulic evaluations of watershed runoff with water quality information to generate pollutant load estimates. For the AEIS evaluations, the method adopted was based on the hydraulic component of the overall pollutant loading analysis.

Runoff amounts resulting from the rainfall on the land not in the Applicants' Preferred Alternatives were calculated taking into account a combination of factors, including watershed and subwatershed boundaries (acres), land uses, and soil hydrologic groups. The combination of land use and soil types was used to develop land use-specific runoff coefficients.

For any given watershed, the flow for a given seasonal or annual period can be calculated by applying the equation:

$$Q = C_D * A * P * j * k$$

This equation is part of a pollutant loading method sometimes called the USEPA Simple Method, and it is often used to predict annual runoff for pollutant loading estimates. For this equation:

Q is the flow in cfs

C_D is the runoff coefficient for the contributing subwatershed

A is the drainage area that contributes flow to the gaged location

P is the total precipitation during the analysis frequency (annual or seasonal)

j is the long-term hydrologic adjustment factor

k is a factor applied for units conversion

The USGS maintains flow recording gages near the downstream ends of each of the major subwatersheds identified in Figures 1 and 2. To calculate seasonal and annual flows in the subwatersheds at the USGS gage stations, the subwatershed-level runoff calculation method was calibrated to the AEIS subwatersheds of interest in the Peace and Myakka Rivers. This was done by using historical rainfall records and GIS-based data for subwatershed boundaries (and subwatershed acreage), soil hydrologic types, land use information, and land use-specific runoff coefficients developed by Janicki (2010) for land areas tributary to the Charlotte Harbor estuary. The referenced long-term hydrologic adjustment factor was used for calibration of this runoff assessment approach to the specific subwatersheds in the study area. In general, j is used to account for a variety of influences on the retention and storage volume within a watershed (for example, either in lakes and reservoirs or in the subsurface soil layers) and it varies between subwatersheds and with annual rainfall amount (i.e., wet year or season versus dry year or season).

This analytical method was tested against USGS gaged flows within the Peace River and Myakka River subwatersheds to validate this empirical approach for the AEIS evaluations. Detailed information on the data used to support method development and the results of method validation analysis are presented in Appendix G. Figures 3 and 4 reflect the method validation demonstration. The discharge calculations generated through this land-use based runoff assessment method closely matched the measured flows based on the applicable USGS gage records. In general, the accuracy of predicting average annual flow rates at the subwatershed level (i.e., at the USGS gages) was about the same as reported for studies with more detailed computer modeling. Using the long-term adjustment factor as a calibration factor for the runoff coefficient water balance approach provided reasonable results when compared to measured flow records. By calibrating these coefficients to observed flow data, the past and present indirect impacts of mining on subwatershed surface water yield are implicitly included in the baseline 2010 conditions.

FIGURE 3
Calculated and Measured Flows at the Horse Creek USGS Gage

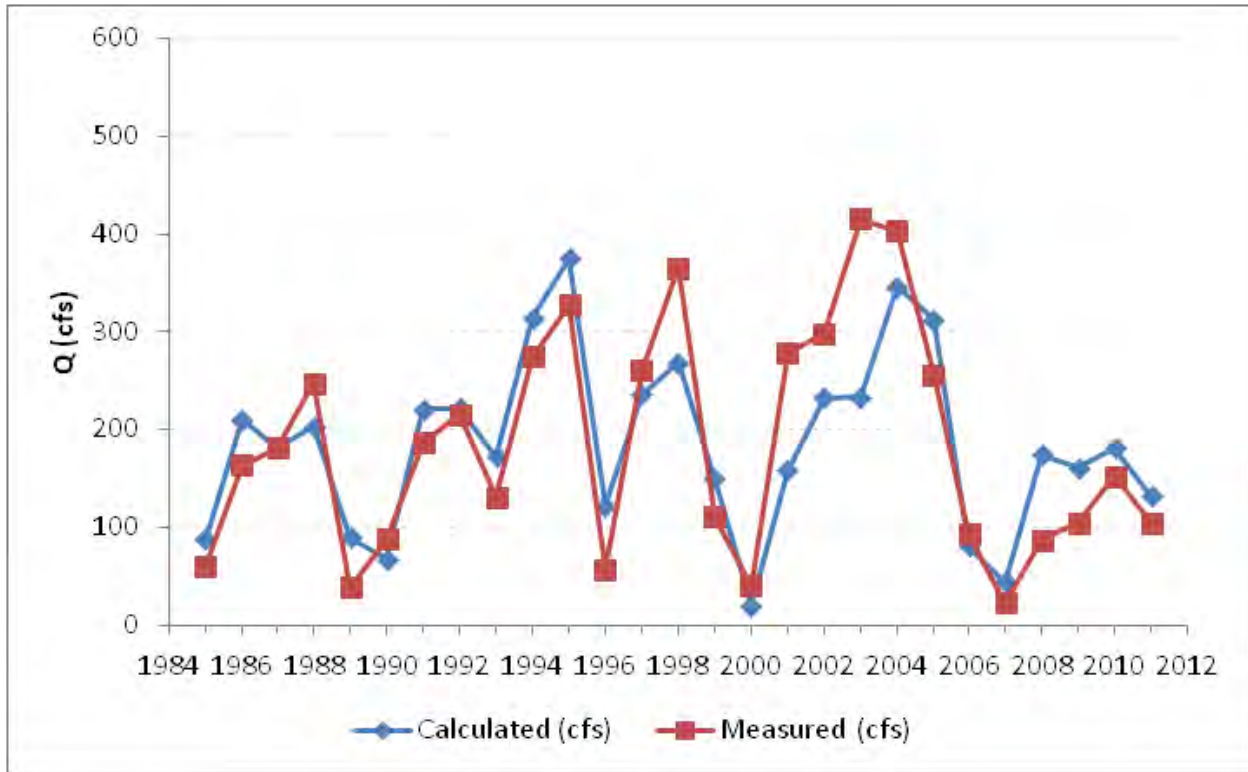
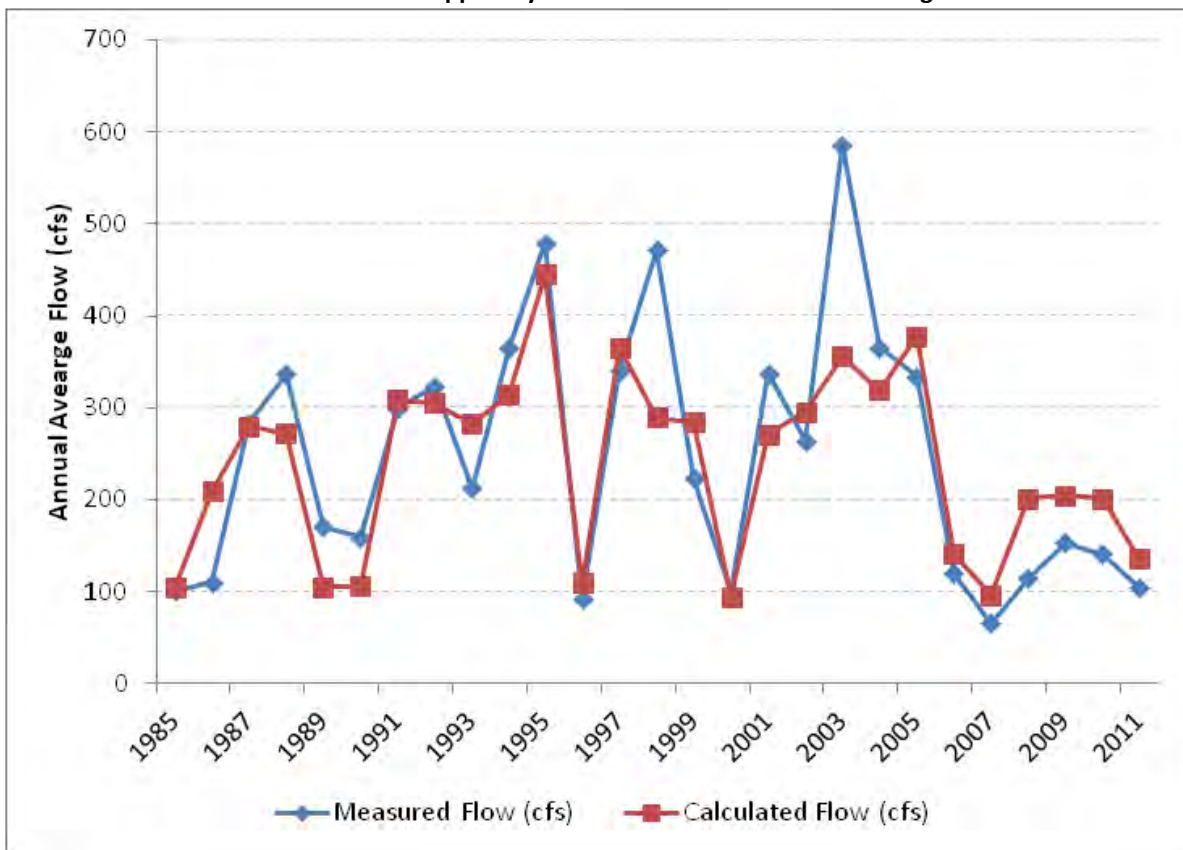


FIGURE 4
Calculated and Measured Flows at the Upper Myakka River Subwatershed USGS Gage



2.2 Key Assumptions Supporting Surface Water Runoff Analyses

Several key assumptions were applied during the surface water evaluations. Because stormwater runoff from natural land is associated with land use, future land use was estimated based on long-term trends and the available information about the existing mines. The No Action Alternative was estimated assuming that no new future mining would be initiated, even though some upland mining could occur if permits were denied and the Applicants modified their applications to avoid jurisdictional wetlands and surface waters. This assumption is conservative for the No Action Alternative because higher surface water flows would be predicted in the future if no additional mining area is captured. If there were mining in uplands only, then the downstream No Action Alternative flows would be somewhat higher because essentially the areas in the capture curves would likewise be smaller. Consequently, the greatest computed impact from the No Action Alternative would be to assume no future mining in these subwatersheds.

Existing mines were assumed to complete mining on schedule and their reclaimed land was assumed to return to predominantly agricultural land use. Additional information about the basis for these computations is provided in Appendix G.

One key assumption was that the current practice of using ditch and berm systems would continue at all mine alternatives to prevent uncontrolled offsite runoff from the active mining area to offsite lands, and also to support capture and retention of surface water within the mine's recirculation system to conserve groundwater and to help hydrate surrounding surficial groundwater. The capture of stormwater at mine sites and the controlled release through outfalls permitted as industrial point source discharges (NPDES) is a regulatory requirement.

Mosaic and CF Industries have included specific features designed to maintain the levels in the surrounding surficial aquifers during mining. The baseflow component and the post-reclamation conditions are addressed by USEPA regulations published at Title 40, Code of Federal Regulations, Part 436.180 (40 CFR 436.180) requiring Mosaic and CF Industries to construct a berm around the perimeter of active mining and reclamation areas to capture stormwater to preclude nonpoint discharges of turbid water and resulting water quality violations. Mosaic and CF Industries design their perimeter ditch and berm systems to contain the runoff generated by a 25-year, 24-hour storm event (Florida Department of Environmental Protection [FDEP], 2006c). Water captured in the ditches adjacent to the berms is routed to CSAs for quiescent settling of solids and subsequent water reuse in the mining process, or is discharged through an outfall permitted under Section 402 of the Clean Water Act (an NPDES permit). Use of this water quality treatment system creates the potential for changes in overland flow to streams as well as the timing of flows, or the stream hydrographs. Mosaic and CF Industries are proposing to site a series of permitted outfalls adjacent to surface waters on or near project boundaries. Use of multiple outfalls would offset the loss of overland flow to the extent practicable as required by 40 CFR 436.180.

Large areas that are to be mined (mine blocks) are surrounded by ditch and berm systems before active mining operations and the ditches support surface water management for the active mine areas until those lands are reclaimed and subsequently re-connected to the watershed by removing the ditch and berm systems (also referred to as being "released" from the regulated areas). Each mine plan shows how the active mining would proceed by mine block during discrete periods of time.

The sequencing of ditch and berm installation around mine blocks, and subsequent reclamation and release schedules, define the timing and duration of removal of the particular mine block areas from contribution to downstream runoff except through NPDES outfalls and seepage from the surrounding ditch and berm systems. The acreage included in a mine's "capture area" varies over time, with the theoretical capture area curve following a somewhat parabolic shape over the course of a given mine's life cycle (these curves are presented in Chapter 4 and in Appendix G). The amount of an active mine's total footprint that is removed from contribution to downstream water deliveries is less than the total footprint, and the relative influence on downstream water deliveries is variable rather than static. Understanding the effects of a given mine on downstream water deliveries thus requires assessment of this dynamic relationship over the full life cycle of the mine. Details on the analysis of capture area relationships for each of the alternatives with schedules are provided in Appendix G.

The capture curves for each of the Applicants' Preferred Alternatives and reasonably foreseeable alternatives were developed as an independent analysis of possible mine acres directly impacted over the life of the mine. The capture area for a given mine represents the portion of the mine which retains its stormwater within the recirculation system for the period of time required to prepare the land for mining, mine the land, fill the mine pits with overburden and sand tailings, reclaim the land, and then monitor water quality until there is adequate documentation allowing mine block release from within the industrial operations' boundaries. The following assumptions based on typical current mining practices were applied in determining the capture areas for each of the four Applicants' Preferred Alternatives as a function of time during the individual mine's life cycle:

- Land clearing is initiated 1 year prior to mining.
- The ditch and berm system is constructed prior to land clearing.
- Areas to be isolated by the ditch and berm system and how the blocks would be mined were defined in the mine plan, based on current practices and typical dragline production rates (except for Wingate East Mine, which uses a hydraulic dredge).
- The active mining operation includes the filling of the mine cuts with sand tailings.
- The reclamation parcel is re-connected to the watershed 1 year after completion of reclamation (total of 3 years).
- CSAs require a minimum of 5 years for consolidation and 3 years for reclamation with the overall average being 10 years from last filling.
- The mine plan and the reclamation plan submitted with the applications were used to determine the years of capture.

The capture curves developed in this manner included the mined and disturbed lands within the mine through reclamation. For each of the four Applicants' Preferred Alternatives, the capture areas developed in this manner are conservative – that is, the area exceeded the maximum acres captured at any one time over the life of the mine as presented in the Applicants' mine plan data submitted in the applications. This independent estimate was applied in the AEIS process to bound potential changes to the schedule that may cause larger area impacts in the future. The capture areas are used to calculate the effect to the stormwater on the mines and associated stream flow in each subwatershed by defining approximate acres and years that the mines would impact watersheds during mining and reclamation activities. A similar analysis was used for the two reasonably foreseeable mines (Pine Level/Keys and Pioneer Tracts) to develop conceptual mining schedules and corresponding capture curves. The analysis of each alternative in Chapter 4 provides the capture curves and any additional assumptions applied for each alternative analyzed with this method.

The ability of a given mine to capture stormwater may be constrained by the available storage capacity in the recirculation system at the onset of rainfall events. This creates a very dynamic system and is largely dependent on the rainfall as well as the mine schedule. For the runoff calculations for each of the Applicants' Preferred Alternatives and the Offsite Alternatives, the AEIS impacts analysis approached the assessment conservatively. The water balance data included in the Water Use Permit (WUP) applications for active mines indicated a maximum 40 percent capture of runoff at existing Mosaic mines, but the data also indicated that during dry years nearly all of the runoff could be retained. To be conservatively high in the reduction of offsite runoff from an active mine area, a runoff capture of 50 percent was assumed to be a reasonably high average surface water reduction. To be even more conservative in times of drought and to form a maximum bounding scenario, it was further assumed that all of the runoff would be captured at times. For this case, the capture area analyses applied in the AEIS ignore the fact that at times some of the water captured in the active mine areas is still delivered downstream, at least through seepage from the ditch and berm system.

The ditch and berm system collects rainfall and reuses it inside the active mines, as described above. One purpose of this system is to provide the stormwater as an alternative water supply for settling ponds in the CSAs. The water stored onsite is subject to evaporation from open water or evapotranspiration (ET) from the soil and cover.

The open water evaporation rate is higher than natural ET rates from uplands, and is a direct impact that may reduce some runoff volume. Similarly, the ET is lower for bare soil, which is another direct impact that may increase some runoff volume. To estimate the relative amount of water available to storage in a year, an annual water balance was conducted to predict the Excess P on the active mine site as follows:

$$\text{Excess P} = \text{Annual P} - \text{ET} - \text{Net Recharge into Surficial Aquifer} - \text{Groundwater Discharge}$$

The Net Recharge into Surficial Aquifer and Groundwater Discharge values were obtained from the regional groundwater model developed by the Southwest Florida Water Management District (SWFWMD) (Chapter 3). The rainfall varied by watershed and ET was assigned to the acreage at each mine site that was a CSA, open mine, or reclaimed conditions. Capture rates were applied to the Excess P to determine the direct impact of stormwater reuse for each alternative. This rate was computed for each year and applied over the Applicants' Preferred Alternatives and reasonably foreseeable alternatives schedules. The values applied for ET and the range of Excess P estimated are discussed in Appendix G. This alternative computation indicated that the runoff coefficient approach provided comparable results for the active mines.

The runoff coefficient values are defined as a function of soils and land use. The surface water delivery can be described as the direct stormwater runoff during and immediately after a rainfall event plus the rainfall that is infiltrated and seeps out to the streams later. Different authors use varying terms to describe the components of the water balance in the near-surface environment. For natural systems on sloped land, there is typically a significant volume of rainfall that infiltrates but re-surfaces at lower elevations, delayed but relatively soon after a storm (from hours to days depending on the slope and geology). While not necessarily computed as direct runoff, this delayed flow is part of the record of surface water delivery as monitored at downstream USGS gages. By using observed gage runoff data to calibrate and adjust the coefficients, the coefficients inherently include all components of the surface water delivery from a watershed. Similarly, these coefficients also implicitly include past and present flow impacts from mining because these factors are reflected in the observed data used during calibration.

The surficial aquifer is the region of most interest concerning direct soil impacts because it is dramatically altered during the mining process. The surface water runoff would be affected by the nature of the top layer of soil (A horizon) and the position of the groundwater table during the year. The amount of rainfall infiltrated is reduced during high water table conditions and stored groundwater could discharge more readily when the water table is closer to the surface. Florida rules require that the restoration of the mines meet their reclamation plan objectives, but primarily with respect to the vegetation goals. The landscape is topographically restored to contours similar to pre-mining conditions, and the soils must be returned in a manner to support their use (uplands, forested wetlands, emergent wetlands, etc.). Once the reclaimed mine is released, the outfalls are removed and there is no practical way to monitor flows. Therefore, it is presumed that the long-term runoff is similar to pre-mining conditions on an area-weighted basis. Appendix G provides an overview of an assessment of the change between pre- and post-mining runoff potential. Based on available data, the net water balances between the pre- and post-mining conditions for each alternative are considered to be similar and the differences small. The runoff coefficient method was considered adequate to apply to the reclaimed mine lands.

Often the local zoning requirements or county-level plans for future land uses influence the post-mining land use (agricultural, water features, etc.); however, on a large-scale average, most of these lands would be used for agricultural purposes after mining. Following typical practices in the region, for the AEIS assessment it was assumed that 46 percent of the mined land is reclaimed to pasture, 42 percent to row crop, 5 percent to forested wetlands, and 7 percent to non-forested wetlands. This change was applied to both the existing mined land after scheduled reclamation and the alternatives analyzed quantitatively.

2.3 Surface Water Assessment Results Format

Surface water delivery for the No Action Alternative was computed for each subwatershed where the Applicants' Preferred Alternatives and the two reasonably foreseeable offsite alternative mine sites are located, with projected land use changes that included the reclaimed existing mines. This involved calculating area-weighted average runoff coefficients for each subwatershed included in the analysis for 2020, 2030, 2040, 2050, and 2060.

For each future year (the 5 cases at 10-year intervals), a spreadsheet-based computation was conducted by applying precipitation to the area-weighted runoff coefficients derived from the soil/land use polygons within the subwatershed.

For each Applicants' Preferred Alternative and the reasonably foreseeable alternatives (six alternatives total), the mine capture area curves were applied for each time period on each subwatershed to remove that amount of the mine's area from contributing flow to downstream stream or river reaches. A revised area-weighted runoff coefficient for the remaining subwatershed (i.e., without the alternative's land area) was computed to evaluate the change to the coefficient applied for that time period's runoff calculation. For the 50 percent capture scenario, runoff estimated from half of the captured mine area was added back to the subwatershed flow. Each Applicants' Preferred Alternative (Ona Mine, Desoto Mine, Wingate East Mine, and South Pasture Mine Extension) and each of the two reasonably foreseeable alternatives (Pine Level/Keys and Pioneer Tracts) was analyzed individually in Chapter 4, including the two alternatives that were qualitatively discussed (Sites A-2 and W-2). The combined effects of multiple mines operating with overlapping periods of activity were evaluated in Chapter 4.

3.0 Surface Water Quality Evaluation Methods

During and following mining, water quality parameters in mine discharges are regularly monitored and reported to the FDEP and in-stream biological conditions are also monitored through various programs (Chapter 3). Near-surface water table levels are also monitored during mining and regularly reported to SWFWMD and FDEP. The water quality assessment presented in Chapter 4 was based on recent data for current mining practices, since the Applicants' Preferred Alternatives would use similar practices.

The primary change to the water quality analysis methodology from the Draft to the Final AEIS was to add plots of the data (in Appendix D) to better illustrate the range of the data. A statistical analysis of upstream, downstream, and outfall water quality as described below was added for the Final AEIS. Additional definitions, assumptions, and explanation were added in Chapter 4 and Appendix D to address public comments and to add clarification.

Evaluation of the potential effects of the Applicants' Preferred Alternatives on surface water quality focused on discharges from NPDES-authorized mine outfalls to surface waters. Discharge monitoring results from eight NPDES outfalls at five mines were used to project the environmental consequences of all of the Applicants' Preferred Alternatives and the Offsite Alternatives on surface water quality. The monitoring data were from the following three mines that were actively involved in rock production, beneficiation, and reclamation, and two that had active reclamation projects ongoing but no rock production or beneficiation activities:

- Active Mines: Four Corners (two outfalls), Wingate Creek (two outfalls), and South Pasture (two outfalls)
- Inactive Mines: Fort Green (one outfall) and Kingsford (one outfall)

All outfall monitoring programs except the South Pasture outfalls also included background (upstream or reference locations) and downstream stations specified in the NPDES permits. Surface water quality characteristics and potential impacts were evaluated using tabular and graphic presentations of descriptive statistics for the outfall, upstream and downstream stations, statistical comparisons of paired data for outfalls and corresponding upstream and downstream stations, and summaries of the frequency of exceedances of applicable criteria where available. Detailed discussions of the methods and results of the analyses are included in Appendix D and selected portions are included in Chapters 3 and 4. Appendix D and Chapters 3 and 4 also provide additional information in response to public comments requesting more detail on numeric nutrient criteria (NNC). The results of sampling for total phosphorus, total nitrogen, and chlorophyll *a* are summarized for several mine outfalls, plus upstream and downstream locations, from 2001 through 2011. It is important to note that these data are provided for informational purposes only. The sampling procedures used to produce the data, and the sampling procedures that may be required to determine NNC compliance, may differ.

4.0 Groundwater Resource Evaluation Methods

A groundwater flow model was developed to support AEIS evaluations of the potential water level changes resulting from the No Action alternative and the Applicants' Preferred Alternatives. The model simulates the effects of pumping the Floridan aquifer on groundwater levels in the surficial aquifer system (SAS), intermediate

aquifer system (IAS), and upper Floridan aquifer (UFA). Modeling was not done for Pine Level/Keys or Pioneer Tracts because there are no specific water supply plans from the Applicants. Assumptions were made that those mines would use existing wellfields, thereby extending the withdrawals over a longer timeframe but not changing the quantity. Alternatives A-2 and W-2 were not modeled because no information is available on the quantity, timeframe, or water supply plans. The model was based on the SWFWMD District-Wide Regulatory Model Version 2.1 (DWRM2.1), which is a MODFLOW model (Harbaugh et al., 2000) used by SWFWMD to conduct groundwater resource evaluations and specifically support its water supply permitting and planning decisions. Additional information on the DWRM2.1 model, including its development and calibration, can be found in its documentation (ESI, 2007). A more detailed description of model development and the simulations conducted supporting this AEIS is presented in Appendix F.

For a groundwater resource evaluation, the potential environmental consequences from phosphate mining must examine potential impacts to the surficial, intermediate, and Floridan aquifers. Chapter 3 provides a discussion of aquifer systems. Use of the Floridan aquifer system (FAS) as a water supply by phosphate mines was identified as a particular issue of concern during the scoping process. The mining industry's groundwater withdrawals cause drawdown of the FAS, which could result in impacts in the form of increased saltwater intrusion, reduced groundwater contributions to regional river flows, and associated net impacts on regional water supply interests of potable water suppliers or others reliant on the Floridan aquifer for water supply purposes. These effects could be direct or indirect effects associated with a single mine, or cumulative effects associated with multiple mines, or multiple mines plus other water users. The surficial and intermediate aquifers were also evaluated using the groundwater model to determine mining operation impacts to the surficial aquifer and Floridan aquifer pumping impacts to the Intermediate aquifer.

Of the alternatives developed in Chapter 2, information on the proposed durations and schedules of mining and associated use of Floridan aquifer wells for water supply augmentation was available from the Applicants to support analysis of the existing operating mines (No Action Alternative) and the four Applicants' Preferred Alternatives (Desoto Mine, Ona Mine, Wingate East Mine, and South Pasture Mine Extension), which were designated Alternatives 2, 3, 4, and 5, respectively. As described in Chapter 3, the Wingate East Mine and the South Pasture Mine Extension are mine extensions, where new mine water supply wells and/or new FAS allocations would not be needed. The extensions would, however, extend the planned period of operations of the parent mine. The Ona Mine would require new water supply wells to be installed in accordance with the already permitted allocation from the FAS. The Desoto Mine is proposed to rely on water supply drawn from an existing phosphate mine well system, with pipeline conveyance to deliver the water to the new mine location.

These water supply strategies would be among those that could be considered by any reasonably foreseeable mine projects. Analysis of the potential effects of the Preferred Alternatives mine projects on the regional UFA, as well as the SAS and IAS, illustrates the order of magnitude effects that can be anticipated for reasonably foreseeable mine projects of similar spatial and temporal scale.

4.1 DWRM2.1 Analytical Overview

The No Action Alternative is described in Chapter 2 and Chapter 4. Under this alternative, existing mines would continue to operate as approved until the end of their rock production, but new permits for the Applicants' Preferred Alternatives would be denied, or modified to eliminate all discharges of dredged or fill material into Waters of the U.S.

Table 1 summarizes the projected periods of mine operations for the existing phosphate mines within the CFPD; this summary represents the No Action Alternative. As indicated, under the 2010 baseline set of operational conditions, the mines in rock production operation consisted of Mosaic's Four Corners/Lonesome, Hookers Prairie, South Fort Meade, and Wingate Creek Mines, and CF Industries' South Pasture Mine. Mosaic's Hopewell facility also maintained an FAS water supply allocation to support ongoing reclamation activities.

TABLE 1

Projected Floridan Aquifer Groundwater Withdrawal Rates (mad) - Alternative 1, No New Mines*Central Florida Phosphate District, FL*

Year	Four Corners	Hookers Prairie	Hopewell	Ona	Desoto	South Fort Meade	Wingate	South Pasture	Total
2010	15.6	4.2	0.5	0	0	11.3	5.8	6.39	43.79
2011	15.6	4.2	0.5	0	0	11.3	5.8	6.39	43.79
2012	15.6	4.2	0.5	0	0	11.3	5.8	6.39	43.79
2013	15.6	4.2	0.5	0	0	11.3	5.8	6.39	43.79
2014	15.6	4.2	0.5	0	0	11.3	5.8	6.39	43.79
2015	15.6	0	0.5	0	0	11.3	5.8	6.39	39.59
2016	15.6	0	0	0	0	11.3	5.8	6.39	39.09
2017	15.6	0	0	0	0	11.3	5.8	6.39	39.09
2018	15.6	0	0	0	0	11.3	5.8	6.39	39.09
2019	15.6	0	0	0	0	11.3	5.8	6.39	39.09
2020	0	0	0	0	0	11.3		6.39	17.69
2021	0	0	0	0	0	0	0	6.39	6.39
2022	0	0	0	0	0	0	0	6.39	6.39
2023	0	0	0	0	0	0	0	6.39	6.39
2024	0	0	0	0	0	0	0	6.39	6.39
2025	0	0	0	0	0	0	0	6.39	6.39

Note:

Yellow-shaded rows indicate years for which steady-state model simulations were conducted and output was generated.

The year 2010 was used as the “baseline year” representing present conditions because at the time of the start of AEIS preparation (February 2011), 2010 was the latest year for which FAS withdrawal information was compiled by the SWFWMD. Conditions of the groundwater resources evaluated using the 2010 withdrawals represented the cumulative effects of all prior phosphate mining, agricultural activities, and urban, industrial, commercial, and recreational development through 2010.

The use of 2010 as the baseline year for AEIS impact evaluations pertaining to SAS, IAS, and UFA water levels was the approach adopted to provide that “...the current aggregate effects of past actions...” was used in the AEIS’ cumulative effects review. Modeling of the current FAS water supply allocations to all users of the Floridan aquifer set the baseline water levels reflecting the influences of all such users, including past uses, and future changes from this baseline to reflect the cumulative impacts of the future scenarios of water supply uses by the various water supply categories. For the groundwater modeling analyses, the nominal 2010 condition actually represents the baseline FAS water supply allocations permitted by the SWFWMD through 2006 and included in the DWRM2.1 model. Since regional water use did not change significantly for 2006 to 2010, this approach was reasonable. Use of this baseline year for comparative purposes is the typical procedure applied by all of the water management districts in assessing the potential effects of any proposed change in existing FAS water supply allocations, and the approach was adopted to support the AEIS to remain as consistent as possible with how the cumulative effects of all user categories on aquifer water levels would be evaluated by the SWFWMD.

The 2010 baseline condition represents SWFWMD’s current level of FAS water supply allocations to all Floridan aquifer users, inclusive of the above listed phosphate mining operations, potable water supply systems, agriculture, recreational irrigation, industrial/commercial operations, and any other permitted wellfield systems. Where those allocations have been reduced by the mining industry, or otherwise modified over time, the FAS

water level recoveries are reflected by the baseline 2010 simulations against which all other scenarios modeled are compared.

As summarized in Table 1, by 2016, the Hookers Prairie allocation is reduced to a lower level solely supporting reclamation activities; the other water supply allocations remain essentially unchanged except for a slight reduction in the allocation for the South Pasture Mine. By 2025, the Four Corners/Lonesome Mine's water supply allocation is reduced to a reclamation support level; the others remain the same. By 2030, only the South Fort Meade and South Pasture Mines are predicted to remain in rock production operation mode. By 2035, only the South Fort Meade Mine is predicted to still be in operation, supporting reclamation. The No Action set of model runs conducted to evaluate the likely changes in FAS water levels associated with this alternative consisted of model runs for these years, highlighted in yellow in Table 1. This set of model runs is based on the no new mines scenario where the four proposed new phosphate mines would not be authorized.

In contrast, Table 2 summarizes the projected operating periods of the existing phosphate mines as well as the Applicants' Preferred Alternatives (Desoto Mine, Ona Mine, Wingate East Mine, and South Pasture Extension Mine). The Desoto and Ona Mines would be new mines with discrete predicted start and stop points in time; their indicated water supply allocations represent new FAS withdrawal allocations compared to the 2010 baseline condition. In contrast, the Wingate East Mine and South Pasture Extension Mine would merely result in increased durations of the operational periods of the Wingate Creek Mine and South Pasture Mine. The rock production operational periods for some of the Applicants' Preferred Alternatives would extend as far as 2048 based on information provided by the Applicants. This timeframe would include reclamation activities. As stated above, on the basis of these projections, the temporal scope for this issue was determined to be 40 years. Within that timeframe, selected years for which model runs were conducted to support AEIS evaluations of the No Action Alternative (Alternative 1) plus the Desoto Mine, Ona Mine, Wingate East Mine, and South Pasture Extension Mine (Alternatives 2, 3, 4, and 5, respectively), as well as the cumulative impacts of Applicants' Preferred Alternatives in combination, are highlighted in yellow in Table 2.

As the withdrawals by the industry change in quantity and location in the future, the water levels in the UFA would change in response to those pumping stresses. In much of the study area, the UFA water levels remain the same or increase, leading to no detrimental impact to other well owners. Where increased drawdown in the UFA occurs, other well owners may experience lower water levels during parts of the year. The model was used to estimate the number of other wells that may experience lower water levels by using the well location file in the model and extracting out the water level change under steady-state conditions. A summary table of the number of wells with more than 1 foot of drawdown resulting from mining withdrawals is presented in Chapter 4 and in Appendix F.

The impact of mining on changes in groundwater discharge to rivers was evaluated using the DWRM2.1 model, the surface water evaluations in Appendix G, and data from the 2010 SWFWMD Water Supply Plan (SWFWMD, 2010a). The Water Supply Plan summarized the surface water available to help meet public supply demand for each watershed. The evaluation of the changes in available surface water was performed using permitted withdrawals from surface water users and the estimated available quantities in each river provided in the 2010 Water Supply Plan (SWFWMD, 2010a). Table 3 presents a summary of surface water availability to meet public supply demand. Using the results of the surface water analysis described in Appendix G and the changes in flow from River cells in the DWRM2.1 model for Alternatives 2, 3, 4, and 5, an estimate of the combined changes in river flow resulting from mining was prepared. The results indicated a net increase in river flow as a result of land use changes in the region and an increased groundwater discharge to the rivers resulting from mining.

TABLE 2

Projected Floridan Aquifer Groundwater Withdrawal Rates, mgd - Alternatives 1, 2, 3, 4, and 5 using Drought Year and Flexible Withdrawals*Central Florida Phosphate District, Florida*

Year	Four Corners	Hookers Prairie	Hopewell	Ona	Desoto	South Fort Meade	Wingate/ Wingate East	South Pasture	Total
2010 ^a	15.6	4.2	0.5	0	0	11.3	5.8	6.39	43.79
2011	15.6	4.2	0.5	0	0	11.3	5.8	6.39	43.79
2012	15.6	4.2	0.5	0	0	11.3	5.8	6.39	43.79
2013	15.6	4.2	0.5	0	0	11.3	5.8	6.39	43.79
2014	15.6	4.2	0.5	0	0	11.3	5.8	6.39	43.79
2015A	15.6	0	0.5	0	0	11.3	5.8	6.39	39.59
2015B	20	0	0.5	0	0	11.2	5.7	6.39	43.79
2015C	15.7	0	0.5	0	0	15.4	5.8	6.39	43.79
2016	15.6	0	0	0	0	11.3	5.8	6.39	39.09
2017	15.6	0	0	0	0	11.3	5.8	6.39	39.09
2018	15.6	0	0	0	0	11.3	5.8	6.39	39.09
2019A	15.6	0	0	0	0	11.3	5.8	6.39	39.09
2019B	20	0	0	0	0	11.6	5.8	6.39	43.79
2019C	16.2	0	0	0	0	15.4	5.8	6.39	43.79
2020A	0	0	0	11.9	0	11.3	5.8	6.39	35.39
2020B	0	0	0	15.0	0	15.4	5.8	6.39	42.59
2021	0	0	0	11.9	10.7	0	5.8	6.39	34.79
2022	0	0	0	11.9	10.7	0	5.8	6.39	34.79
2023	0	0	0	11.9	10.7	0	5.8	6.39	34.79
2024	0	0	0	11.9	10.7	0	5.8	6.39	34.79
2025A	0	0	0	11.9	10.7	0	5.8	6.39	34.79
2025B ^a	0	0	0	15	10.7	0	5.8	6.39	37.89
2026	0	0	0	11.9	10.7	0	5.8	6.39	34.79
2027	0	0	0	11.9	10.7	0	5.8	6.39	34.79
2028	0	0	0	11.9	10.7	0	5.8	6.39	34.79
2029	0	0	0	11.9	10.7	0	5.8	6.39	34.79
2030	0	0	0	11.9	10.7	0	5.8	6.39	34.79
2031	0	0	0	11.9	10.7	0	5.8	6.39	34.79
2032	0	0	0	11.9	10.7	0	5.8	6.39	34.79
2033	0	0	0	11.9	10.7	0	5.8	6.39	34.79

TABLE 2

Projected Floridan Aquifer Groundwater Withdrawal Rates, mgd - Alternatives 1, 2, 3, 4, and 5 using Drought Year and Flexible Withdrawals*Central Florida Phosphate District, Florida*

Year	Four Corners	Hookers Prairie	Hopewell	Ona	Desoto	South Fort Meade	Wingate/Wingate East	South Pasture	Total
2034	0	0	0	11.9	10.7	0	5.8	6.39	34.79
2035	0	0	0	11.9	10.7	0	5.8	6.39	34.79
2036A	0	0	0	11.9	0	0	5.8	6.39	24.09
2036B	0	0	0	15	0	0	5.8	6.39	27.19
2037	0	0	0	11.9		0	5.8	6.39	24.09
2038	0	0	0	11.9		0	5.8		17.70
2039	0	0	0	11.9		0	5.8		17.70
2040	0	0	0	11.9		0	5.8		17.70
2041	0	0	0	11.9		0	5.8		17.70
2042	0	0	0	11.9		0	5.8		17.70
2043	0	0	0	11.9		0	5.8		17.70
2044	0	0	0	11.9		0	5.8		17.70
2045	0	0	0	11.9		0	5.8		17.70
2046	0	0	0	11.9		0	5.8		17.70
2047A	0	0	0	11.9		0	0		11.90
2047B	0	0	0	15		0	0		15.00
2048	0	0	0	11.9		0	0		11.90
2049	0	0	0	0		0	0		0.00
2050	0	0	0	0		0	0		0.00
Transient Model Peaking Factor	1.74	1.64	1.25	1.88	1.88	1.62	1.25	1.17	

Note:

^aTransient models also developed for these scenarios.

Minor quantities may be used for reclamation activities as facilities close down. The South Pasture Mine withdrawals in years 2036 and 2037 are for reclamation and infill parcels.

Yellow-shaded rows indicate years for which steady-state model simulations were conducted and output was generated.

TABLE 3
Surface Water Available to Meet Public Supply Demand
Central Florida Phosphate District, Florida

Watershed	SWFWMD Water Supply Plan					Watershed Wide Mining Operation Impacts from 2009 to 2050		
	Adjusted Annual Average Flow ^a mgd	Permitted Average Withdrawal ^a mgd	2003 to 2007 Withdrawal ^a mgd	2003 to 2007 Unused Permitted Withdrawal ^a mgd	Unpermitted Potentially Available Withdrawal ^a mgd	Change in Surface Water Runoff ^b mgd	Change in Streamflow Contribution from Groundwater ^c mad	Total Change in Streamflow Contribution ^d mgd
Peace River	813.0	32.8	14.9	17.9	80.4	62.69	14.52	77.21
Hillsborough River	255.0	113	91.6	21.4	TBD	NC	2.78	NC
Alafia River	261.0	23.6	15.7	7.9	18.5	NC	3.02	NC
Manatee River	117.0	35	30	5	2.2	NC	0.25	NC
Little Manatee River	98.6	8.7	3.7	5	0.2	NC	0.36	NC
Myakka River	163.5	0	0	0	41.7	18.10	1.15	19.25
Withlacoochee River	1002.0	0.5	0.01	0.49	93.2	NC	0.96	NC
Total	2710.1	213.6	155.91	57.69	236.2	80.8	23.0	96.5

Notes:

^a Values are from SWFWMD 2010 Water Supply Plan

^b Values are from Surface Water Analysis, Appendix G (Only the Peace and Myakka River Watersheds were assessed for future changes to flow resulting from land use change in the AEIS)

^c Values are from Groundwater Modeling River Cells for Alternatives 1, 2, 3, 4, and 5

^d Sum of Change in Surface Water Runoff and Change in Streamflow Contribution from Groundwater

NC = Not Calculated

Seasonal variability in withdrawal rates typically results in regional lowering of aquifer levels during the spring dry season and recovery of water levels in the winter. This evaluation was performed by first compiling regional withdrawals for all water use types for 7 years (from 1996 to 2002) using information from SWFWMD. This compilation was used to determine the monthly multipliers applicable to each water use type (i.e., public supply, agriculture, industrial, etc.). Those multipliers were used in the future model simulations to ultimately develop the seasonal water level changes tables and graphs. Seasonal recharge values were obtained from the DWRM2.1 transient model calibration files and were applied to the future model simulations in the appropriate month of the simulations. Three transient models were set up to evaluate seasonal variations within the IAS Zone 1, Zone 2, and the UFA aquifer layers using 13 stress periods, or time periods. Variations in the SAS were not evaluated because the SAS was not calibrated to transient conditions. Also, the River and Drain cell elevations were not modified from steady state. As a result, the DWRM2.1 cannot be used to reliably simulate the SAS under transient conditions. Therefore, seasonal variations in SAS water levels were not simulated. Seasonal variations can only be simulated reliably using a local-scale model that incorporates the site-specific aquifer, surface water, topographic, and drainage detail that was unavailable for this study.

The base year 2010 was modeled along with two models for the year 2025: one representing the change in withdrawal from all users and one for the change in withdrawal by mining only. The mining withdrawal is the same as in Alternatives 2, 3, 4, and 5: 2025B with the Ona Mine at its flexible permit withdrawal rate. The transient model peaking factor was applied to the Stress Period 5, which represents the month of April (Ona: 1.88, Desoto: 1.88, Wingate East: 1.25, and South Pasture Extension: 1.17). An intermediate peaking factor was applied to the month preceding and following April in order to represent the dry season. The rest of the months were adjusted downward, so that the average withdrawal for the year is the same as the drought year average annual. The other users' well withdrawals were adjusted according to well type using the multipliers, which were averaged using data from the DWRM2.1 transient calibration as discussed above.

4.2 Key Working Assumptions for the Groundwater Modeling

Tables 1 and 2 reflect the drought year permitted annual FAS allocations and the currently anticipated FAS use periods for the indicated mines based on the existing WUP-defined allocations currently authorized by the SWFWMD (Mosaic WUP No. 20011400.025, expiration 2032; CF Industries WUP No. 20003669.010, expiration 2017). For these AEIS evaluations, a key assumption applied was that the Applicants' currently authorized annual average FAS allocations would remain the same out through 2040. Additionally, it is notable that these groundwater model simulations are conservative estimates of the potential effects of these new mine projects on aquifer water levels since the simulations were run using drought year withdrawals, which are significantly higher than permitted annual average and more so when actual withdrawals are considered.

The water supply allocations used in the modeling are drought year withdrawals that could be conducted to support matrix extraction and transport to the beneficiation plants, and for subsequent clay and sand tailings conveyance. In reality, actual pumping rates vary depending on precipitation. Phosphate mines in the past decade have used substantially less than their drought year or annual average water supply allocations authorized under WUPs because of modified water management practices, including a greater reliance on surface waters contained within their recirculation systems.

As addressed in Chapter 3, some mines have not had to pump their FAS wells for years, because adequate water supply was available as a result of rainfall accumulations and industry efforts focused on water conservation and reuse. Conversely, under drought conditions, increased pumping rates and longer duration FAS withdrawals can be needed. For this AEIS evaluation, however, the analysis focused on long-term average conditions and the conservative approach adopted was to conduct the model simulations using the annual average allocation rates.

As noted above, DWRM2.1 is the primary analytical tool used by the SWFWMD in evaluating proposed water supply allocations from the FAS under its water use regulatory program. Mosaic recently completed consolidation of its various mine-specific individual WUPs into an Integrated Water Use Permit (IWUP). Detailed groundwater modeling was conducted in support of the IWUP application (Progressive Water Resources [PWR], 2011) using a model based on DWRM2.1. The groundwater modeling conducted in support of this AEIS is different than the modeling recently conducted by Mosaic to support the IWUP application in several ways. For example, in the

application, standard SWFWMD water use permitting simulations are run without making changes to any of the groundwater withdrawals of other water users included in the model. In contrast, for analysis of potential effects of projects addressed under this AEIS, the analyses included consideration of future changes in such allocations for other users.

A second difference between the AEIS modeling and standard groundwater modeling supporting Mosaic's IWUP application reviews by SWFWMD is that the water use permitting simulations only addressed Mosaic's projected FAS water uses to 2030, which corresponded to the duration covered by the IWUP. For the AEIS, simulations had to address various mine operations through approximately 2050, and also had to account for the proposed changes to the CF Industries duration of use of the South Pasture Mine/South Pasture Mine Extension wells.

In the Southern Water Use Caution Area (SWUCA) recovery strategy, SWFWMD recognizes that "annual withdrawals from the Floridan aquifer need to be reduced by 50 mgd (from 650 to 600 mgd) to ensure that the saltwater intrusion minimum aquifer level is met." However, "if withdrawals were optimally distributed (i.e., declines in the most impacted areas and increases in the least impacted areas) a reduction of significantly less than 50 mgd would be required."

Nonetheless, for the DWRM2 model, a 50-mgd reduction of agricultural groundwater use was used, with all other users capped at their current levels. It should be noted that in the same report, SWFWMD recognizes that reductions in phosphate industry groundwater quantities have played an important role in SWUCA recovery, stating, "Average daily use of groundwater associated with mining and processing of phosphate ore in the SWUCA has declined from over 300 mgd in the mid-1970s to less than 75 mgd in recent years..." (SWFWMD, 2006b). Allocations for groundwater withdrawals for other users would be maintained at their current levels. Thus, for the AEIS modeling evaluations, projected agricultural use reductions of 50 mgd were accounted for, but all other users' allocations were maintained at the 2006 rates included in the DWRM2.1 model. It was assumed that withdrawal rates in the base year conditions of 2010 were the same as in 2006, since there was very little growth in demand between 2006 and 2010.

For the modeled scenarios, a linear rate of decrease (-2.5 mgd/yr) in agricultural withdrawal allocations was assumed to occur between 2005 and 2025. This reduction was simulated as follows:

- 2010 12.5 mgd reduction
- 2020 37.5 mgd reduction
- 2030–2060 50 mgd reduction

The reductions above were applied proportionally to each agricultural well in the SWUCA, based on the well's simulated withdrawals. These types of adjustments to account for changed allocations of other users in the future are not applied during water use permitting-based modeling analyses. While it is recognized that agricultural use reductions would not be uniform throughout the region, there is no reasonable methodology available to predict the future pattern of change so the uniform assumption is the best available method for incorporating the changes in agricultural use in the model.

These differences are noted to clarify that the AEIS modeling results are not comparable to those generated by PWR (2011) because of the different analytical objectives, the modeling assumptions applied, and the different modeling conditions included in the respective analyses.

4.3 Groundwater Model Results Presentation Formats

Each model run consisted of a steady-state simulation for which drawdown was calculated and compared relative to 2010 conditions. While water demand projections were developed for every mine for the years 2010 through 2050, model runs were only conducted for years in which there were significant changes in withdrawals relative to adjacent years (for example, a new mine might begin operating, or a mine might have shut down). Many years have the same pumpage as the preceding and following years; thus no additional information would be gained by running annual simulations because the results would be identical.

The SWFWMD has established a Saltwater Intrusion Minimum Aquifer Level (SWIMAL) for the SWUCA (SWFWMD, 2002b). This level is the "*minimum aquifer level necessary to prevent significant harm caused by saltwater*

intrusion in the UFA in the SWUCA.” The SWIMAL is calculated each year based on the 10-year average water level in 10 specific SWFWMD monitoring wells in the SWUCA. Each well is assigned a weight based on a GIS analysis performed by the SWFWMD. The individual well averages and weights are used to develop a single SWIMAL value for the aquifer.

Because this study evaluated simulated drawdown rather than aquifer levels, the simulated drawdown at each observation well was multiplied by the adjusted SWIMAL weight to obtain a weighted drawdown for the well. Individual weighted drawdowns were summed to quantify the simulated change in the SWIMAL for each model run.

The simulated water level change is presented in 85 Regional Observation Monitoring Well Program (ROMP) monitor wells that are within the model domain: 16 wells in Layer 1, 17 wells in Layer 2, 18 wells in Layer 3, and 34 wells in Layer 4. Unlike the SWIMAL, the water level change at each of these wells is assessed separately. The monitor wells were selected from a database of 1,304 wells in the SWFWMD. The 85 wells were selected because they comprised the network of wells used to calculate the SWIMAL, were within the SWUCA, were not located close to one another, represented a good distribution across the study area, and are completed in each of the aquifer zones of interest (i.e. SAS, IAS, and UFA).

For the No Action Alternative (Alternative 1) and the Applicants’ Preferred Alternatives (Alternatives 2, 3, 4, and 5) and for each simulation year analyzed, two predictions were run. For all simulations, water level changes were determined in the SAS, IAS Zone 1, IAS Zone 2, and UFA ROMP wells. The No Action Alternative was simulated with the applicable mine water supply allocations for drought year withdrawals with all other groundwater users unchanged at 2010 rates. Agricultural uses remained unchanged for these simulations. A second set of simulations was run for the same conditions except with the 50 mgd agricultural reduction included. The offsite alternatives were not included in the modeling because no water supply plans are available.

For the Applicants’ Preferred Alternatives, the water supply allocations from Alternative 1 were added to the projected allocations in Alternatives 2, 3, 4, and 5. These simulations are the cumulative impacts simulations. These simulations were run the same as above, with one set of simulations including the applicable mine water supply allocations for drought year withdrawals and all other groundwater users unchanged at 2010 rates. Agricultural uses remained unchanged for these simulations. A second set of simulations was run for the same conditions except with the 50 mgd agricultural reduction included. The indicated combinations of mine operations over the study period provided information on the effects of all mining with and without the agricultural reduction.

The comparative analysis yielded estimates of the relative magnitude of the phosphate mining effects on the SAS, IAS, and UFA water levels and the relative spatial extent of drawdown or recovery effects out to a 0.5-foot contour (either drawdown [- values] or recovery [+ values]). These measures also were used to calculate an overall relative influence of phosphate mining withdrawals for the indicated simulation years calculated for the CFPD, and comparative metrics were also calculated for the influence of all users combined. Lastly, the results allowed calculation of the effects of the various mine combinations in relation to conditions at specific regional monitoring wells (ROMP wells) for which SWFWMD has set Minimum Flows and Levels (MFL) targets. The ROMP well groupings are addressed further in the discussion of modeling results presented in Chapter 4 and in Appendix F.

4.4 Qualitative Assessment of Groundwater Effects

As explained in the introduction to this section, modeling was not done for Pine Level/Keys or Pioneer Tracts because there are no specific water supply plans from the Applicants. Assumptions were made that those mines would use existing wellfields, thereby extending the withdrawals over a longer timeframe but not changing the quantity. Alternatives A-2 and W-2 were not modeled because no information is available on the quantity, timeframe, or water supply plans. These alternatives’ effects on groundwater were considered qualitatively, by extrapolating the modeled results of other alternatives or existing mines’ effects. Pine Level/Keys Tract was compared to Desoto Mine, Pioneer Mine was compared to Ona, Site A-2 was compared to the existing South Fort Meade Mine, and Site W-2 was compared to the existing Wingate Creek Mine.

5.0 Ecological Resource Impact Analysis Methods

Ecological resources could be impacted by various aspects of phosphate mining operations, such as land clearing in advance of mining, mining activities, and construction of the infrastructure supporting mining such as access roads, pipeline corridors, and CSAs. Ecological effects may be direct such as the clearing of wetlands within areas to be mined, or indirect, such as the dewatering of wetlands adjacent to mining areas. For the Draft AEIS, the ecological impact analyses for all alternatives evaluated, including the Applicants' Preferred Alternatives, were based largely on GIS-based data/tools. Public comments received on the Draft AEIS recommended that the ecological impact analyses for the Applicants' Preferred Alternatives be based primarily on field-collected data included in the Applicants' federal Section 404 permit applications to allow for more accurate representation of the ecological resources that exist on the Applicants' Preferred Alternatives. In response to these recommendations, the ecological impact analyses conducted for the Applicants' Preferred Alternatives for the Final AEIS were based primarily on information included in the Applicants' Section 404 permit applications. The information obtained from the Section 404 permit applications for the ecological impact analyses included field data collected by the Applicants on aquatic biological communities, wetlands/waters, wildlife habitats, and listed species, as well as the Applicants' proposed impact avoidance/minimization measures and compensatory mitigation.

Site-specific field data on ecological resources for the offsite alternatives were unavailable at the time of preparation of this AEIS. In lieu of collecting field data for each offsite alternative, the following GIS-based data/tools were used to support the analysis of potential impacts of each offsite alternative on ecological resources:

- 2009 SWFWMD Florida Land Use, Cover, and Forms Classification System (FLUCCS) data (SWFWMD, 2009a)
- USGS National Hydrography Dataset (NHD) data (USGS, 2013b)
- Critical Lands and Waters Identification Project (CLIP) tool (Florida Natural Areas Inventory [FNAI] et al., 2011)

FLUCCS is the primary system used to classify land use and cover in Florida (see Chapter 3). For this AEIS, FLUCCS data were used to estimate the spatial coverage (in acres) and composition (types) of wetlands, non-stream surface waters, native uplands (rangelands and upland forests), and agricultural land on each offsite alternative. The comprehensive FLUCCS data for the offsite alternatives are provided in Appendix E-1.

The NHD is a USGS digital-vector dataset used for mapping and geospatial analysis of surface waters (USGS, 2013b). For this AEIS, NHD data were used to estimate the total stream length (in linear feet) on each offsite alternative. The linear feet of streams were calculated as the combined length of all NHD flowline features except for the "canal/ditch" feature. The comprehensive NHD data for the offsite alternatives are provided in Appendix E-2.

CLIP is a GIS-based tool that allows rapid assessment of the ecological quality and importance of a given parcel of land in Florida. The CLIP User Tutorial includes guidelines for use of CLIP data, including a disclaimer that CLIP data are not intended to be used for regulatory permitting decisions. For this AEIS, CLIP provides estimates of the quality of wetlands on each offsite alternative without the need to obtain permission to access the sites, do field surveys, etc. Any U.S. Army Corps of Engineers (USACE) permitting decisions related to this AEIS would be supported by additional data beyond the data available using CLIP, including site-specific, field-verified information.

The CLIP tool was developed through a collaborative effort between the FNAI, University of Florida, and Florida Fish and Wildlife Conservation Commission (FFWCC). The CLIP tool has been revised and updated with new data since its initial creation in 2006. CLIP 2.0, the 2011 update of the tool used for this AEIS, is organized into a set of core GIS data layers that are combined into five resource models: Biodiversity, Landscapes, Surface Water, Groundwater, and Marine. Depending on the model or data layers used, CLIP can provide a broad assessment of the overall ecological quality of an area, or it can provide a more focused assessment of the quality of a specific resource within an area, such as wetlands. According to the CLIP tool, areas or specific resources that are ranked as CLIP Priority 1 or 2 have the highest priority for conservation significance (FNAI et al., 2011). In lieu of Wetland Rapid Assessment Procedure (WRAP) or Uniform Mitigation Assessment Methodology (UMAM) data, which are

not available for the offsite alternatives, the CLIP “Wetlands” GIS data layer, which is a component of the CLIP Surface Water model, was used to assess the quality of wetlands on each offsite alternative. The CLIP Wetlands layer has six priority levels, reported from 1 to 6. Priority 1 represents the highest conservation priority level and Priority 6 represents the lowest conservation priority level. For this AEIS, wetlands ranked as CLIP Priority 1 and 2 are considered to represent wetlands of high quality, wetlands ranked as CLIP Priority 3 and 4 are considered to represent wetlands of moderate quality, and wetlands ranked as CLIP Priority 5 and 6 are considered to represent wetlands of low quality on each offsite alternative. Accordingly, the percentages of wetlands ranked as CLIP Priority 1 and 2 (high-quality wetlands), wetlands ranked as CLIP Priority 3 and 4 (moderate-quality wetlands), and wetlands ranked as CLIP Priority 5 and 6 (low-quality wetlands) were calculated for each offsite alternative. The comprehensive CLIP Wetland data for the offsite alternatives are provided in Appendix E-3.

6.0 Economic Evaluation Methods

An independent assessment of the effects of the Applicants’ Preferred Alternatives on economic activity was performed to support the evaluation of the consequences of projects proposed by the Applicants and currently under USACE review.

Information on the proposed durations and schedules of mining were available for the four Applicants’ Preferred Alternatives (Desoto Mine, Ona Mine, Wingate East Mine, and South Pasture Mine Extension). In addition, conceptual mine plans were prepared for two offsite alternatives (the Pine Level/Keys Tract and Pioneer Tract). These two offsite alternatives were evaluated as alternatives to the Applicants’ Preferred Alternatives, and as reasonably foreseeable alternatives as part of the cumulative impacts assessment. Insufficient information was available to prepare similar analyses for the two other offsite alternatives (A-2 and W-2). In addition, these alternatives were not considered reasonably foreseeable. The economic analyses considered the potential effects of each of the four Applicants’ Preferred Alternatives for the expected life of each mine, plus the cumulative mining impacts of the four proposed mines, plus the two reasonably foreseeable offsite alternatives from the 2010 baseline condition through 2060.

The AEIS economic evaluations included evaluation of direct, indirect, and induced impacts of the Applicants’ Preferred Alternatives and the two reasonably foreseeable offsite alternatives on an eight-county region consisting of five counties in the CFPD and three adjoining counties. The analyses of the individual mines consider the impacts of the four Applicants’ Preferred Alternatives, and two reasonably foreseeable offsite alternatives. The cumulative areawide analyses evaluated the impact of all of the Applicants’ Preferred Alternatives and reasonably foreseeable offsite alternatives being permitted, as well as the impact of multiple alternatives being approved in a single county (Hardee), and the impacts of the Wingate East Mine, Desoto Mine, and Pine Level/Keys Tract being approved on the combination of DeSoto and Manatee Counties. Direct, indirect, and induced impacts are defined as follows:

- **Direct Impacts** – Refers to the change in the impact of a change in “final demand” on a given business or industry. In this case it refers to the change in value of phosphate production and agricultural production resulting from the permitting of the Applicants’ Preferred Alternatives and the two reasonably foreseeable offsite alternatives.
- **Indirect Impacts** – Indirect impacts are the employment and income generated by the purchase of goods and services from local suppliers by the directly impacted industries.
- **Induced Impacts** – Induced impacts result from changes in household expenditures, as employees of the directly or indirectly impacted businesses purchase goods and services in the local economy.

Direct economic effects would be anticipated predominantly on the specific counties where the proposed mines would be located. Some direct impacts may also accrue to surrounding counties. For example, this analysis associated direct employment and labor income impacts to the place of work (location of mine), not the place of residence. To the extent that employees reside in another county, it could be argued that some direct employment and labor income impacts would occur to the surrounding counties. Indirect and induced economic effects would occur on the counties where the mines would be located and to varying degrees on the surrounding counties. For this economic analysis, the area included in the evaluation encompassed each county in its entirety,

not just the areas that would be mined or downstream from the proposed mines. The direct impacts on the prospective host counties (Manatee, Hardee, and DeSoto Counties) were evaluated along with the indirect and induced effects on these counties, as well as for Polk, Hillsborough, Charlotte, Sarasota, and Lee Counties. Economic impacts outside the eight-county region were not included in this analysis.

Direct impacts would result from the mining and reclamation activities and changes in agricultural activities in the Applicants' Preferred Alternatives as land currently devoted to pasture, citrus, and row crops would be converted to mining and then returned to agricultural or other uses over the study period. Other direct impacts would relate to revenues to local governments, including severance taxes and ad valorem taxes. Indirect and induced impacts would consist of secondary impacts generated by the purchase of goods and services from local suppliers by the mining and agricultural activities and by their employees. Indirect and induced impacts resulting from direct impacts were estimated using an economic modeling application called Impact Analysis for Planning (IMPLAN) (MIG Inc., 2012). Information on IMPLAN is accessible at www.implan.com/.

The purpose of these evaluations was to compare a number of different scenarios associated with their respective economic values:

- No Action Alternative
- Alternatives 2 through 7—The impact on host counties of individual alternatives, referred to as the “Mining Alternatives” (as noted previously, Alternatives 8 and 9 are not considered further in this analysis)
- Mining Contribution to Cumulative Impacts—The areawide impacts of permit approval of the individual mines plus reasonably foreseeable offsite alternatives This includes:
 - The impact of the three Hardee County mines (Ona Mine, South Pasture Mine Extension, and Pioneer Tract)
 - The impact of Manatee and DeSoto County mines (Desoto Mine, Wingate East Mine, and Pine Level/Keys Tract)
 - The impact of mines in an eight-county region, resulting from the Applicants' Preferred Alternatives and the Pioneer and Pine Level/Keys Tracts

The impacts in each analysis were measured for 10-year increments over a 50-year period (2010 to 2060). The 10-year increments were used for this analysis because the timing of the mining was not considered precise enough to warrant shorter time increments. This analysis projected the average annual level of economic productivity over each 10-year period. The total impacts were the summation of the direct, indirect, and induced impacts. The net present value of the difference in output or income between the mining alternatives and the No Action Alternative was calculated to estimate the change in employment and income associated with the mining scenario being evaluated. Present value analysis is a tool for comparing alternatives with varying schedules of costs and/or revenues over time. Future costs and revenues are discounted to estimate their present worth.

6.1 Overview of Calculation Methods

Key calculation methods supporting the economic evaluations are summarized in the following paragraphs.

6.1.1 Value of Output (Total Income)

The monetary value of the direct output of the mining and agricultural activities was calculated by associating the change in land use within the mine footprint over time with an estimated land use revenue production rate. The change in land use associated with each mine over the 50-year period was forecast based on the mine plans. The number of acres of land mined in each 10-year period multiplied by the average tonnage of phosphate rock produced per acre and by the value of the phosphate rock per ton provided the value of the phosphate rock produced in each 10-year period. Similarly, the average annual inventory of land in each 10-year period devoted to agricultural activities (pasture, citrus, vegetables, and melons) multiplied by the estimated crop value per acre provided the average annual revenue from crop production in each 10-year forecast period.

6.1.2 Severance Tax Revenues to Local Governments

The state collects a tax on the amount of phosphate rock mined. A portion of the revenue collected by the state is returned to the counties from which the phosphate was mined. The severance tax rate is applied to the phosphate produced to derive the state tax revenue estimate. The portion of this revenue returned to each county was calculated per the formula specified in the state law authorizing the collection of the severance tax. These revenues are considered a redistribution of the revenue generated from the production of the phosphate rock.

6.1.3 Indirect and Induced Effects

The indirect and induced economic impacts were estimated using the economic modeling software IMPLAN. IMPLAN calculates economic impacts in a transparent manner using known data sources for its calculations. For this analysis, data specific to the Applicants' Preferred Alternatives and beneficiation plants in the eight counties were used. The IMPLAN data, derived from the U.S. Census Bureau and other government sources, approximates how, from where, and on what products and services various industries spend money. IMPLAN also estimates the employment effects by industry. The IMPLAN analysis was based on national transactions in 2008. This was the most recent version of IMPLAN available at the time this analysis was prepared. Regional models based on the national model are adjusted to reflect the industries in the specific region and their purchases and output or production.

6.1.4 Net Impact

The present value of the total income, value added, and labor compensation impacts were calculated for the individual or cumulative impacts of the Applicants' Preferred Alternatives and the No Action Alternative. The present value of the No Action Alternative over the 50-year period was subtracted from the various mining alternatives to estimate the impacts of the applicable mining projects. This difference between the various Applicants' Preferred Alternatives and the No Action Alternative is the net impact of the Applicants' Preferred Alternatives.

6.2 Key Assumptions Supporting the Economic Analyses

Key assumptions were applied to aid in developing the economic impact evaluations presented in this Final AEIS. The assumptions are in several broad categories, as discussed in the following paragraphs.

6.2.1 Economic Impact Model Selection

The AEIS economic analysis provides an estimate of the impacts of the alternatives on the local and regional economy. The new phosphate rock production and the associated reduction in agricultural production are the direct impacts of the alternatives. A model of the economy is used to estimate the indirect and induced impacts of these direct impacts, which include the purchase of goods and services from the local economy by the mining and agricultural companies, and purchases by their employees.

There are three recognized commercially available models that can be used for this purpose:

- IMPLAN – Impact Analysis for Planning (MIG, Inc., 2012)
- RIMS II - Regional Industrial Multiplier System (U.S. Department of Commerce, 1997)
- REMI – (Regional Economic Models Inc., undated)

6.2.1.1 IMPLAN

IMPLAN is a regional input/output (I/O) model. I/O models are based on a cross-sectional analysis of the economy that describes the transactions between the various sectors of the economy (industry, trade, services, etc.). For each sector, the purchases of supplies, services, and other inputs and sales of products and services between sectors are mapped. Assuming that these transactional relationships do not change, the mapping allows the model to predict how a change in demand in one sector will affect the demands in other sectors. IMPLAN is based on national transactions that are then regionalized based on regional purchase coefficients that estimate the

portion of the total demand for a good or service in a region that is satisfied by local suppliers of that good or service. A region is defined in IMPLAN as a county or collection of counties.

6.2.1.2 RIMS

RIMS II (RIMS) is similar to IMPLAN in that it is also based on an I/O analysis. RIMS, however, is less complicated. It involves the purchase of multipliers for each sector in the region, which an analyst can use to estimate the change in output for other goods and services, employment, and income in the region, based on a change in final demand for a good or service.

6.2.1.3 REMI

REMI has been variously described in the literature as a conjoined I/O model and behavior model, or as an I/O model integrated with an econometric and computable general equilibrium model. REMI incorporates forecast changes in the regional economy over time in a “control forecast,” and then runs a separate forecast that incorporates an anticipated change due to the policy decision, new industry, or other direct economic impact to the region. It uses the change from the control forecast to determine the change in output, employment, and income.

6.2.1.4 Model Comparison

Each of the I/O models includes approximately 500 economic sectors (industries), about 11 of which are mining-related, and allows users to estimate a variety of economic statistics (revenues, value added, employment, and income). Each I/O model is based on national statistics from the U.S. Bureau of Economic Analysis (BEA) and other sources, and adjusts the national information to reflect the regional economy in differing ways.

IMPLAN and RIMS are widely used by government agencies, universities, and others for similar types of economic impact analyses such as those conducted for this AEIS (Lynch, 2000). These models are relatively easy to use and transparent, with results that are replicable. In addition, their results can be explained relatively easily. One main difference between the IMPLAN and RIMS models for their use in this analysis is that the IMPLAN model allows the analyst to more readily and accurately make changes to the economy (i.e., add sectors that may not currently be in the region), whereas the multipliers for RIMS are based on existing sectors in the region. Thus, in DeSoto County, which does not currently have any phosphate mining, there would not be any RIMS multipliers for this sector. IMPLAN allows the user to modify the economy in the county to include this new sector.

REMI is a significantly more complex model that includes an I/O default option, but offers the advantage of being dynamic, with an analysis that can consider changes in the economy over time. This can also be a disadvantage because the accuracy of the projections will depend on the underlying econometric model, which is not straightforward for the user to verify or for others to replicate. For situations where the model will be used for multiple years and can be refined over time, such as for analyzing tax policies by states, these disadvantages can be overcome. The complexity of the model and associated analysis also makes explaining any resulting analysis to decision-makers and the public more challenging.

The focus of the economic analysis for this AEIS is on the direct, indirect, and induced impacts of a change in primarily just two sectors—phosphate mining and agriculture. IMPLAN was selected to perform the analysis for these reasons, as well as the study area’s location in a primarily rural economy, which is not changing rapidly. In addition, the Applicants’ Preferred Alternatives would contribute to sustaining employment in the industry and preventing the region from experiencing a significant contraction relative to the No Action Alternative. Thus, it is not anticipated that the Applicants’ Preferred Alternatives will lead to changes in the economic structure of this region over time, a scenario that may benefit from a dynamic modeling approach.

6.2.2 IMPLAN Model and Analysis

The IMPLAN model and analysis was based on costs and revenues in 2008 dollars. Present value analysis assumes a 2.0 percent real discount rate per the White House Office of Management and Budget (OMB) 2012 Circular A-94 (OMB, 2012).

The value of production of agricultural crops from the IMPLAN model for each crop was divided by the acres of land devoted to production of those crops in the county based on a GIS analysis of the land use in each county, to derive the average revenue per acre that was applied to the forecast land use at each Applicants' Preferred Alternative, to project agricultural revenue for those mine sites.

The parcels comprising each of the Applicants' Preferred Alternatives were provided by the Applicants.

6.2.3 Mining and Reclamation Timeline and Costs

Mining operations were assumed to be complete within 4 years of the end of rock production. Reclamation was assumed to be complete within 8 years of the end of mining operations in accordance with Florida law. A reclamation cost of \$8,015 per acre was assumed based on information from the FDEP Bureau of Mining and Minerals Regulation: Mandatory Reclamation Financial Assurance Requirement MOA Contouring Not Complete, for 2008 (FDEP, Updated December 13, 2012). Reclaimed land would be available for other uses within 8 years of completion of mining operations

6.2.4 Phosphate Revenues

Revenue per ton of phosphate was assumed to be \$90.78, which is the average from 2009 through 2011 for United States imported natural calcium phosphates (U.S. Department of Commerce Bureau of Census, Commodity 2510). Table 4 shows the estimated phosphate produced in tons per acre; the rate varies by mine. The value of 7,858 tons per acre was used for existing mines based on the weighted average of permit applications for the four Applicants' Preferred Alternatives.

TABLE 4
Phosphate Production in Tons per Acre
Central Florida Phosphate District, Florida

Mine	Tons per Acre Mined
Desoto	6,453
Ona	9,139
Wingate East	11,726
South Pasture Extension	8,035
Existing Mines	7,858

6.2.5 Beneficiation Plants

It was assumed that two new beneficiation plants would be constructed during the first decade of mining, one for the Desoto Mine and the other for the Ona Mine. In addition, the individual mine analyses for the Pioneer and Pine Level/Keys Tracts assumed that beneficiation plants would be constructed for these alternatives. However, for the cumulative impact analyses, it was assumed that the beneficiation plants constructed for the Ona and Desoto Mines would also be used for the Pioneer and Pine Level/Keys Tracts, respectively. Thus new beneficiation plants would not be constructed for the Pioneer and Pine Level/Keys Tracts for the cumulative analysis. The cost of constructing a new beneficiation plant and associated infrastructure was estimated at \$1 billion, based on information provided by the Applicants.

6.2.6 Employment

The employment and employee compensation for each agricultural crop in each county from the IMPLAN model were divided by the acres of land devoted to production of those crops in the county, based on a GIS analysis of the land use in each county, to derive the average employment per acre and average employee compensation per acre, that was applied to the forecast land use at each Applicants' Preferred Alternative, to project agricultural employment and agricultural employee compensation for those mine sites.

6.2.7 Tax Revenues

Data on average annual tax revenue per acre by land use were collected from the tax assessor's offices in each county for each of the Applicants' Preferred Alternatives. Property tax revenues were projected based on mining plan land use projections and average tax rates per acre by land use for each county. The state severance tax rate was assumed to be \$1.61 per metric ton in the first decade, which is the rate collected by the state for the period from January 1 – June 30, 2012. The severance tax rate was assumed to increase to \$1.81 per metric ton in the second through fifth decades. The percentage of the state severance tax distributed to all of the counties with mining activities was assumed to be 12.8 percent, per legislation adopted in 2012. These revenues are shared among all of the counties in the CFPD and Hamilton County in proportion to their shares of the state's total phosphate production.

An additional 10 percent of the severance tax revenues collected by the state is distributed to counties identified as Rural Areas of Critical Economic Concern (RACECs). Counties in this group include Hardee, DeSoto, and Hamilton. These revenues are shared among these counties in proportion to their respective shares of projected phosphate production.

Each county in which the Applicants' Preferred Alternatives or offsite alternatives are located collects a local option sales tax or surcharge. The mining and agricultural activities are expected to generate additional sales tax revenues for the local governments. However, these revenues have not been included in this analysis. This is a conservative assumption and has the effect of underestimating the revenues to local governments, under both the No Action Alternative and the Applicants' Preferred Alternatives.

6.2.8 Land Use

For the Applicants' Preferred Alternatives, the post-reclamation land use was based on a GIS analysis of the Applicants' post-reclamation land use plans. For existing mines and the offsite alternatives, it was assumed that 40 percent of the reclaimed land would be used as pasture after reclamation. This estimate likely underestimates the amount of post-mining lands that would be devoted to agricultural pursuits, having the effect of underestimating the value of post-mining agricultural production and reducing the net economic impact of the Applicants' Preferred Alternatives.

The amount of acreage on each of the Applicants' Preferred Alternatives devoted to various agricultural and other uses was based on GIS analysis of the land use on each mine site. The initial distribution of agricultural lands on each of the Applicants' Preferred Alternatives and offsite alternatives between pasture, crop land, citrus, and other land uses was assumed to reflect the distribution of lands devoted to these crops in the county in which the mine resides. This initial distribution was based on information provided by the county tax assessor's offices.

6.2.9 Water Supply and Ecosystem Services

A significant portion of each alternative is undeveloped and lies in a natural state, as uplands, wetlands, streams, etc. These natural lands provide a number of ecosystem services that have value from an economic perspective. These services include those provided by wetlands, for example, which contribute to surface water supplies, help filter or naturally treat the water, help recharge groundwater supplies, and provide habitat for fish and wildlife.

The intent of the economic analysis of these ecosystem services was not to estimate the value of these services, but rather to describe these services, and as practicable estimate the physical change in these services (such as change in air quality, noise levels, groundwater recharge, etc.) under each alternative.

Chapter 4 described the current conditions, described anticipated physical changes that would result under each of the Applicants' Preferred Alternatives, and to the extent practicable quantified the physical impacts (acres of wetlands impacted, changes in water quality, etc.). It is often difficult to place a market value on these services because there is no active market for aesthetics, wildlife habitats, and so on. While a number of methods have been developed to try to estimate the value of these services, they often require extensive data collection, surveys, or sophisticated economic modeling, and the accuracy of results is often questioned. The analysis of the ecosystem impacts focused, therefore, on qualitatively describing these economic impacts.

Chapter 4 of this AEIS summarized the findings of the projected impacts of the Applicants' Preferred Alternatives and offsite alternatives on surface water, groundwater, water quality, ecological resources, and land use and recreation. The findings showed that while the impacts were major prior to mitigation, with mitigation the ecosystem impacts were minor to moderate with the exception of Listed Species, which with mitigation had an insignificant effect. Based on this information, it was determined that a qualitative description of these impacts was sufficient. Similarly, the cumulative impacts on these ecosystem services while major with no mitigation were minor to moderate with mitigation; as a result, a qualitative description of these impacts was deemed appropriate.

6.2.10 Water Resources

It was assumed, based on hydrologic modeling, that there would be no substantive reductions in flows that would affect recreational uses of surface waters. Also, based on the mitigation framework that would be applied by the USACE to avoid, minimize, and/or restore or otherwise compensate for stream and wetlands losses, this mitigation credit would be adequate to compensate for the debit incurred by mining and other phosphate operations. Therefore, there was no basis for evaluation of economic impacts to these resources.

6.2.11 Other Assumptions

- Four Corners Mine is equally distributed between Polk, Hardee, Manatee, and Hillsborough Counties.
- Land that is currently used in agricultural production or is in a natural state that is not mined would continue in its current use until mined.
- Hamilton County phosphate production was assumed to be 3.1 million short tons annually, which is the average annual production of the Swift Creek mine (the only mine currently operating in Hamilton County). While Hamilton County is not in the study area, its phosphate production does affect the total severance tax revenues collected by the state, and the portion of these revenues returned to the counties in the CFPD.

6.3 Economic Evaluation Results Format

For each scenario analyzed, the direct economic effects calculated included the value of phosphate rock and agricultural product revenues generated for each of the evaluated decades. The associated severance tax and subsequently the portion of this tax returned to the applicable county were calculated, and the estimated property tax accrual to the county was accounted for. The IMPLAN tool was applied to each decade-based analysis to estimate the overall indirect and induced economic effects of the calculated direct revenue productivity. IMPLAN provided estimates of employment generated by the direct impact totals by decade, and the estimated indirect and induced employment, labor income, value added, and revenue increases associated with the changes in phosphate and agricultural productivity over time. The results are presented as summary tables in Appendix H, presenting the direct impacts calculated and the net present value assessment of the overall effects of the scenario with and without the subject mine. More detailed breakdowns of the direct, indirect, and induced impact estimates for each analysis for the applicable decade are provided in Appendix H.

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Appendix C:

Replacement Pages for Appendix G

Surface Water Hydrologic Impact Analysis for the Final AEIS on Phosphate Mining in the CFPD

PREPARED FOR: U.S. Army Corps of Engineers, Jacksonville District

COPY TO: U.S. Environmental Protection Agency
Florida Department of Environmental Protection

PREPARED BY: CH2M HILL

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1.0 Introduction

The U.S. Army Corps of Engineers (USACE) is conducting investigations to support an Areawide Environmental Impact Statement (AEIS) focused on new phosphate mining applications submitted by Mosaic Fertilizer, LLC (Mosaic) and CF Industries, Inc. (CF Industries) within the Central Florida Phosphate District (CFPD). This technical memorandum (TM) addresses the anticipated surface water hydrological effects of each of the four Applicants' Preferred Alternatives for new phosphate mine projects, Desoto (Alternative 2), Ona (Alternative 3), Wingate East (Alternative 4), and South Pasture Mine Extension (Alternative 5) on watershed discharge to the study area surface waters.

The USACE has received and is processing Clean Water Act Section 404 permit applications for these four Applicant Preferred projects, and they are considered individually as alternatives and are the primary focus of the overall AEIS analyses. As required by the National Environmental Policy Act (NEPA), other alternatives have been identified for consideration and include four offsite alternatives for more detailed evaluation in this AEIS (see Chapter 2). These four alternatives include two that Mosaic has identified as projects that could likely be pursued within the general planning horizon of the next 50 years. They are the Pine Level/Keys Tract (Alternative 6), which could be a stand-alone alternative but will be considered in the cumulative impacts discussion as an extension to the Desoto Mine, and the Pioneer Tract (Alternative 7), which also could be a stand-alone alternative but is also considered in the cumulative impacts discussion as an extension of the Ona Mine. The other two offsite alternatives are identified as Sites A-2 (Alternative 8) and W-2 (Alternative 9) and are not considered to be in the 50-year planning horizon by either Applicant but serve as independent alternatives for further evaluation in this AEIS. However, these latter two alternatives were not evaluated in detail because they are not considered to be reasonably likely to be mined in the planning period and only qualitative information is available for these locations. In any event, their expected hydrologic impact would be similar to those evaluated for other alternatives. Their hydrologic impact as offsite alternatives is included and discussed qualitatively in Chapter 4 of the AEIS but not included as part of this detailed quantitative analysis in this TM.

The locations of the each of the four Applicants' Preferred Alternatives in relation to the Peace River and Myakka River watersheds are shown in Figures 1 and 2, respectively. Three of the sites of the Applicants' Preferred Alternatives (Desoto, Ona, and South Pasture Mine Extension) are primarily in the Horse Creek and Peace River at Arcadia subwatersheds of the Peace River watershed. The site of the fourth Applicant Preferred mine (Wingate East) is primarily in the upper Myakka River subwatershed of the Myakka River watershed. The Pioneer Tract alternative is south of the Ona Mine location (Figure 1). The Pine Level/Keys Tract alternative is west of the Desoto Mine location (Figure 2). Accordingly, this surface water hydrologic analysis primarily focused on the specific subwatersheds where the mines are within the AEIS study area.

The main goal of this assessment was to address the sensitivity of the overall river watersheds and the affected tributary subwatersheds to the impacts of each of these four individual Applicants' Preferred Alternatives on average rates of watershed discharge to downstream reaches of the systems where they are located. The potential cumulative impact of the Applicants' Preferred and two reasonably foreseeable future offsite alternatives on stream and river annual average flows was also predicted taking into account when mining activities would be expected to occur concurrently during the projected life cycles of the various mine projects (i.e., combined impact on surface water discharge). In addition to the average annual discharge rates, a dry year and a dry season were analyzed to address concerns raised after the Draft AEIS was published that the main effects would be realized during droughty periods and that the dry season watershed delivery could be impacted.

This TM addresses the following topics:

- Analytical approach and validation
- Land use projections
- Capture area projections within active mines
- Stream flow projections and evaluation of hydrologic effect on surface water delivery
- Low flow effects at surface water withdrawal points

FIGURE 1

Location of the Three Applicants' Preferred Alternatives (Desoto, Ona, and South Pasture Mine Extension) and the Offsite Alternatives Pioneer Tract and Alternative A-2 in the Peace River Watershed

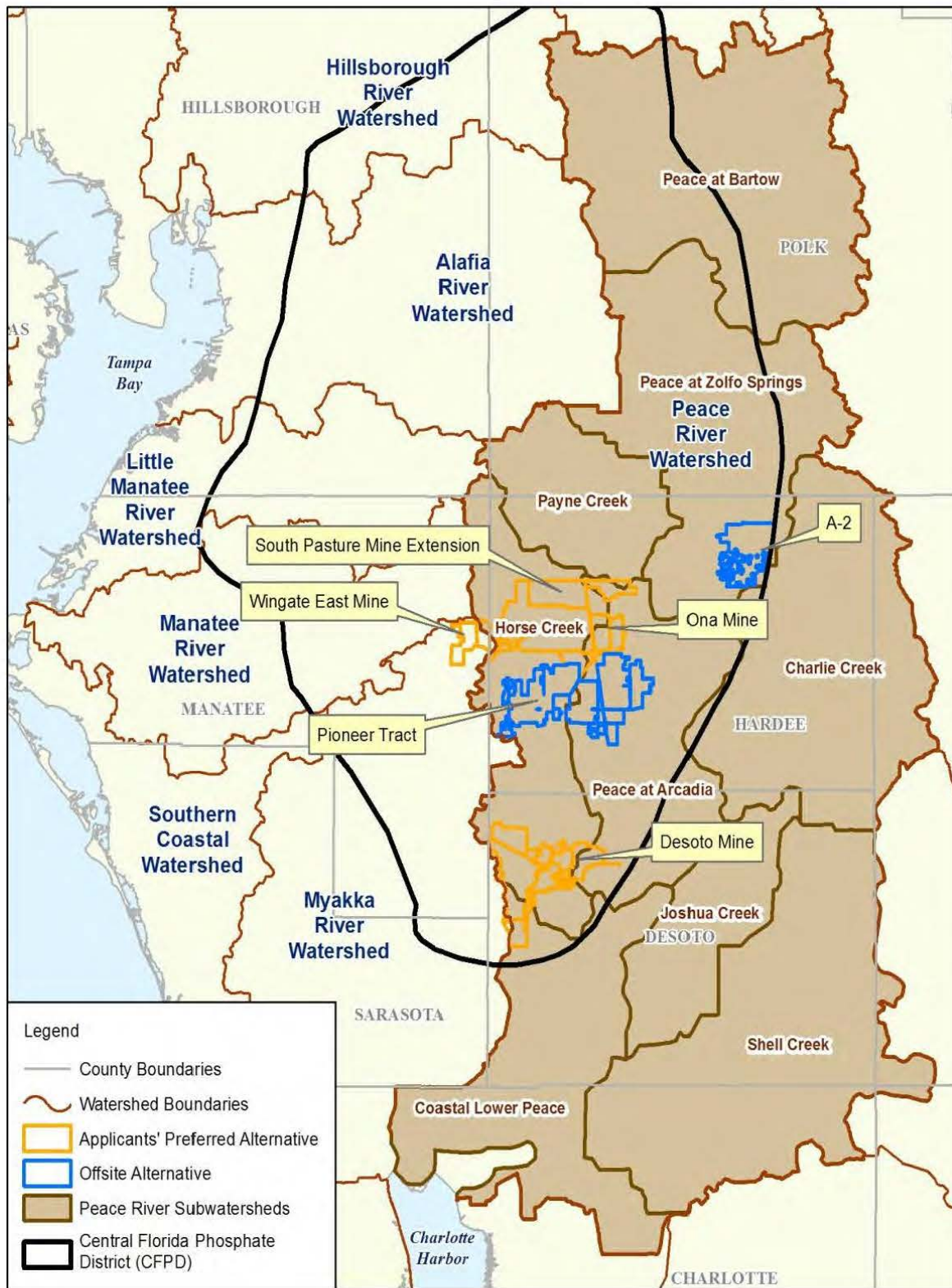
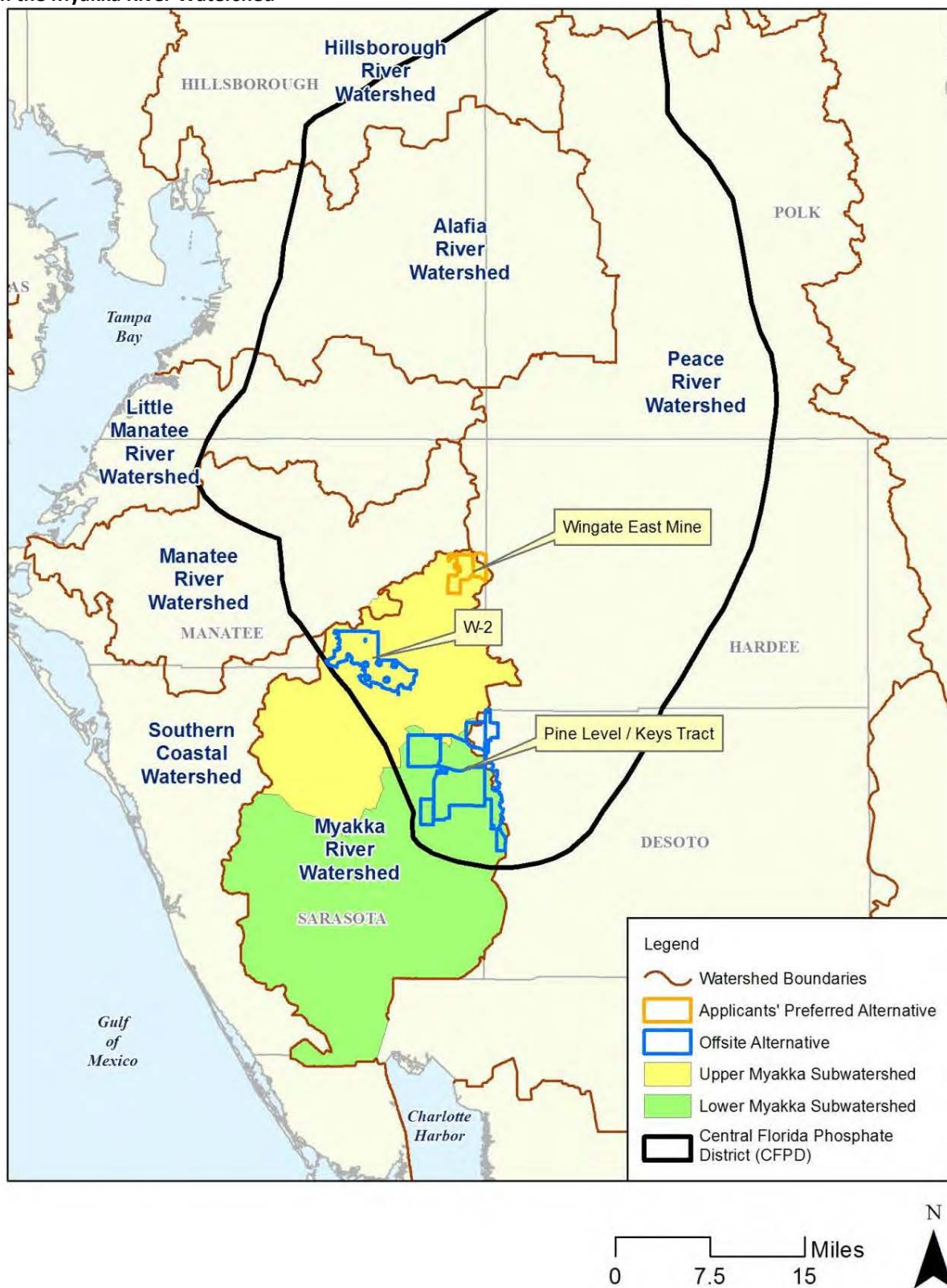


FIGURE 2

Location of the One Applicant Preferred Alternative (Wingate East) and Offsite Alternatives Pine Level/Keys Tract and W-2 in the Myakka River Watershed



2.0 Analytical Approach and Validation

The Florida Department of Environmental Protection's (FDEP) application analyses typically address the adequacy of the water management system to provide stormwater management aligned with event-based design storms. The AEIS evaluations, in contrast, are more aligned with addressing the potential long-term effects at different times in the future. The mining activities effect on water contribution to the applicable subwatersheds and/or overall river watershed where the subject mine site is located is of prime concern here. Where multiple mine projects are within the same subwatershed or river watershed, the long-term cumulative hydrologic effects of these multiple projects during their periods of overlapping operations must be evaluated. In general, the AEIS is a more regional analysis looking at trends and the relative magnitude of mining effects on the overall water balance, while more detailed evaluations specific to the mine sites are required in the permitting process by the various agencies. The results of the AEIS will be used to determine if there is a reasonable need for further evaluations in the federal permitting process.

Over the 100+ years of phosphate mining in the CFPD, the management of surface water during the mining phase has substantially changed. The management methods that would be used in the Applicants' Preferred projects are very similar to those currently being used on active mines. Practices prior to the 1980s (approximately) are not indicative of future activities. For future mines, each of the Applicants proposes to use the same conservation practice that currently minimizes groundwater withdrawals—namely, the capture, retention, and use of stormwater. During phosphate mining, much of the direct rainfall on a given active mine area is captured and held within a mine's recirculation system, consisting of a network of open-channel ditches and canals, clay settling area (CSA) impoundments, and a network of pipelines used for water/matrix/sand/clay slurry conveyance. Following capture, the stormwater is used and reused to support these onsite settling, water use, and conveyance functions¹, supplemented with groundwater as needed. The capture and use of stormwater in lieu of groundwater was a direct result of the 1978 USEPA Areawide EIS (USEPA, 1978a and 1978b) and has been the standard practice for phosphate mining since then.

The AEIS uses the terms *active mining area* and *captured area* synonymously when discussing surface water impacts. Specifically, stormwater falling on areas that are mined is controlled and managed under a National Pollutant Discharge Elimination System (NPDES) permit until FDEP approves the release of the areas after reclamation is completed. As a result, there tends to be less direct runoff from active mines and more control structures that make peak runoff rates (i.e., offsite flood contribution from larger storms) during mining less of a concern. For the AEIS, a reasonable quantification of the potential reductions in the seasonal offsite flow rates during active mining was developed to evaluate the reduction of runoff that may occur on a long-term average basis. This approach also supported the assessment of the cumulative impact from multiple mines on net downstream water deliveries for the subwatersheds and for the overall river watersheds affected by each of the Applicants' Preferred Alternatives. Peak flooding impacts during large storms were not a significant AEIS consideration, as these effects are already evaluated and controlled during active- and post-mining conditions.

2.1 Analytical Goals

The methodology applied to assess surface water runoff changes resulting from mining operations must meet the following goals:

- Account for runoff differences between different soils and land uses.
- Support analyses of impacted subwatersheds as well as the overall river watersheds where the subject mines are located.

¹ Water demand is not primarily required for the transportation of material by slurry pipelines. Onsite surface water is consumed (lost) in processed ore product, seepage, or to ET. Water is stored onsite to facilitate the settling of solids and to mitigate potential onsite surficial groundwater dewatering impacts to adjacent wetlands and streams with the ditch and berm system. These process and ET losses would occur whether the ore is transported hydraulically or by an alternative means. The small quantity of groundwater pumped for lubricating the pump seals becomes part of the onsite water inventory. Prior to the current practice of capturing stormwater (pre-1970s), the industry used much more groundwater and discharged after use which, in turn, artificially increased stream flow. The current practice of recycling was implemented to reduce the groundwater impacts that existed prior to the mid-1970s.

- Account for seasonal components since southwest Florida has distinct dry and wet seasons.
- Account for changes in land use, including mining, far into the future (to 2060) with reasonable accuracy.

The level of accuracy and precision of the input data needs to be consistent with these goals because the accuracy of the results will be affected similarly. For example, predicting land use change 50 years in the future is speculative, so detailed analysis of runoff from future land use is less accurate the further in time one predicts (future land use is discussed later in this TM). There is a variety of information derived from the literature review of past work that needs to be taken into account when considering the AEIS analysis approach, some of which is summarized below:

- The overall total area of active mining changes during the study period, with active mining occupying up to approximately 30,000 acres at any one time. Historic data and previous evaluations of existing watershed runoff found in the literature include the effects from 20,000 to 40,000 acres of existing or recent mining activities in the record. The Applicants' Preferred mine plans would not increase the total area of active mining in the CFPD, but the projects would affect different locations.
- Retention, groundwater seepage, and release of surface water in recent history should be reflected in the observed data record proportional to the amount of active mining occurring in that contributing subwatershed.
- Ditch and berm systems at mines help to maintain hydration and provide some low flow (also known as baseflow) in the upper tributaries of the riparian systems that are not mined and adjacent to capture areas. So, low flow conditions should not be severely impacted by mining activities, at least adjacent to the rehydration areas (see Figure 3 for a schematic of this type of system). While the groundwater table (blue line in Figure 3) is lowered in the open cuts (dewatered), the recharge ditch keeps the groundwater outflow (arrow in Figure 3) positively seeping back to the adjacent wetlands and streams and to generally help maintain groundwater levels in adjacent offsite areas. Because of local variations in soils, the effectiveness of the ditch and berm system may vary. The FDEP requires monitoring wells to determine system effectiveness. During low flow periods, baseflow in intermittent streams may seep back into the ground further downstream.
- Actively mined lands must reclaim blocks within a given time schedule. Mined land is not released from the Environmental Resource Permit (ERP) unless the reclaimed land characteristics are similar to pre-mining land conditions of the same type according to the mine reclamation plan. FDEP guidelines used for permitting CSAs require that:
 - Post-reclamation discharge volumes not exceed by more than 5 percent, nor be less than 85 percent, of pre-mining discharge volumes as simulated for the 25-year return storm event.
 - Post-reclamation peak discharges not exceed the peak discharge for pre-mining conditions as simulated for the 25-year return storm event.

These event criteria may not create similar long-term runoff characteristics. One study of CSA runoff and long-term settling (Reigner and Winkler, 2001) indicates that these criteria tend to cause teams to over-design the post-reclamation storage in the CSAs. For example, in the CF Industries South Pasture Mine Extension application (CF Industries, 2010b) the pre- and post-reclamation water balance indicated that more rainfall is retained in the surficial aquifer post-mining. Both of these documents note that rainfall infiltrates the surface layer of reclaimed soil and then flows in the surficial aquifer system (SAS). While direct runoff from the site is reduced, the ultimate disposition of this SAS water is a delayed baseflow response in the watershed from this area because deep percolation does not change. This is discussed further below under the topic of low flows (Section 6).

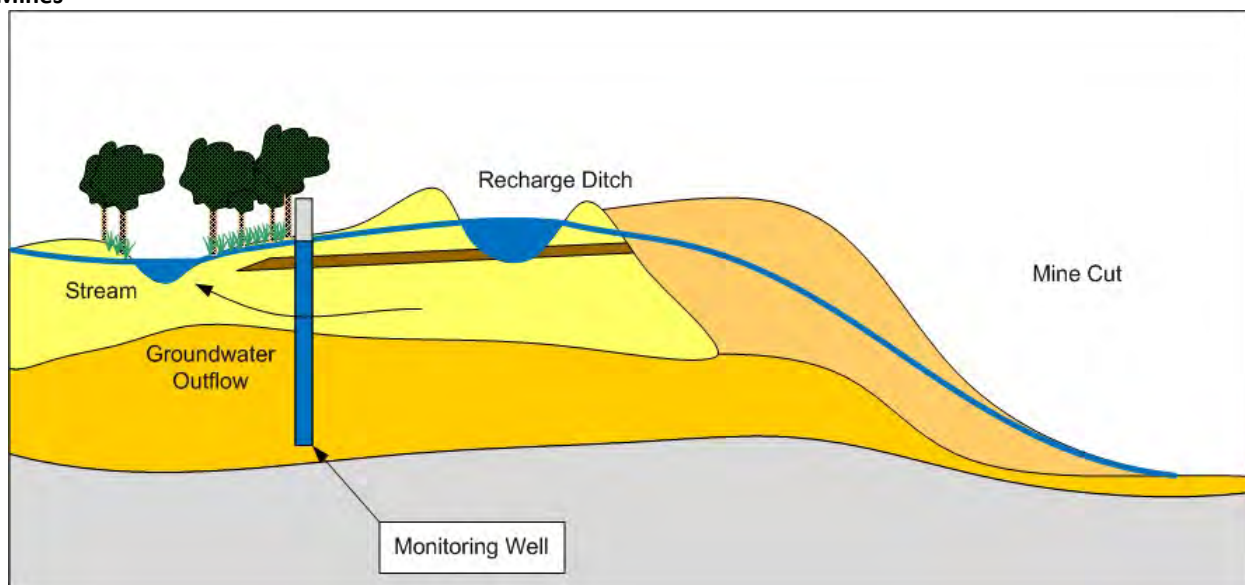
- The Southwest Florida Water Management District (SWFWMD) and others have extensively characterized flows in the subwatersheds, changes in flow over time, and various effects on runoff. A main conclusion from these studies is that the runoff rates are highly correlated to precipitation. Karst features in the upper Peace River watershed are primarily between Bartow and Fort Meade, such that there is a high degree of interaction

between the upper Floridan aquifer and surface water (Metz and Lewelling, 2009). In fact, the upper Floridan aquifer tends to contribute to baseflow further south in the watershed where the potentiometric surface starts to approach the ground surface.

- No gypsum stacks are proposed in the watersheds where the Applicants' Preferred mine sites are located; the existing stacks are associated with the fertilizer and chemical plants and not the mines.
- Previous computer simulation results in these watersheds varied from observed data as follows: from 10 to 17 percent during the calibration of the Peace River Integrated Model (PRIM) during low flow conditions (MODHMS²; Evans, 2010); about 10 percent for Charlie Creek for all flows (MIKE SHE; Lee et al., 2010); and from 3 to 20 percent at locations in the upper Myakka River on an average annual flow basis (MIKE SHE; Interflow Engineering, LLC [Interflow], 2008a). This range of variability is not uncommon for any long-term hydrologic simulation project regardless of modeling approach.
- Critical low flow periods may vary year to year and the range of observed flows at the U.S. Geological Survey (USGS) gages in the Myakka River and Peace River watersheds is large. Most literature divides the discussion of runoff between dry and wet seasons as defined by the long-term data averages (monthly). Peninsular Florida (including the CFPD) has different wet and dry seasons than areas further north.

FIGURE 3

Schematic of Typical Ditch and Berm System to Maintain Groundwater Levels and Seepage to Land Adjacent to Active Mines



Modified from Garlanger (2011)

- Climate change effects on long-term precipitation rates are uncertain and speculative. In general, researchers tend to assert that the long-term average precipitation would continue to change only slightly in Florida; perhaps a slightly lower average annual rainfall will result from higher temperatures, but precipitation could become more variable with an increase in storm intensity (Fernald and Purdum, 1998b; Karl et al., 2009). Consequently, recent estimates of rainfall are sufficient (see Attachment A for local data summary). Sea level effects are documented by the National Oceanic and Atmospheric Administration (NOAA) and may affect the estuaries' salinity regime in the future. Rising sea level effects on the downstream estuaries are not within the scope of the AEIS.

² MODHMS, used for the PRIM model, is based on a vendor's proprietary software (HydroGeoLogic, Inc.) and it is not a widely used program. MIKE SHE is another vendor's integrated surface water and groundwater computer model that also has been applied to portions of the CFPD. MIKE SHE is a commercially available simulation program from DHI Water & Environment and has been applied in more locations in Florida than MODHMS to date (opinion based on local knowledge).

2.2 Brief Overview of Available Simulation Modeling

As noted above, a variety of reports, summaries, and other modeling efforts are available in the literature for the Peace River and Myakka River watersheds. This section provides a brief summary of a review of available types of models and their applicability to this evaluation. However, there are a few constraints that are common to any approach selected:

- Future land use data are not available out to 2060 (i.e., 50 years).
- Not all future offsite alternative plans are known. Evaluations of impacts to these alternatives are based on typical mining practices and not on a specific plan by an applicant.
- Post-mining soils are highly disturbed, but the overall porosity of the surface (to a depth of approximately 20 feet) remains similar because of the presence of overburden, which has the same sand/silt/clay content as the original soil. Although hardpan layers may be broken, these impervious layers in the SAS are not so extensive that they isolate the surface layers from the lower layers in the Applicants' Preferred Alternatives. The same statement is true for various horizons of soil with varying clay content. CSAs do have low permeability, but their area of low percolation averages out over a larger mine footprint with the sandy soils near the NPDES discharge points. Little direct literature is available to demonstrate changes resulting from mining at small scales; so the AEIS team must rely on permit criteria, compliance data, and computer simulation results.

The model review summary is divided into the following categories: integrated models, dynamic models, continuous watershed models, and steady-state models.

2.2.1 Integrated Models

(Examples: MODHMS, MIKE SHE, IHM/USF)

- Integrated models either have not been finalized at the time of the AEIS evaluation or developed for the entire Peace and Myakka River watersheds contributing to the upper Charlotte Harbor. The PRIM model was requested from the SWFWMD, which stated that this application was still under development at the time that the AEIS work was being conducted. Scenarios modeled in PRIM did not include the Applicants' future mining plans or the offsite alternative mines' land uses. The PRIM model does not simulate the hydrology of active mines directly, and the mines' net effects are part of the input data (i.e., NPDES discharge data are entered as a point source time series; HydroGeoLogic, Inc. [HGL], 2012b). Additional areas to be added are un-gaged and would therefore be uncalibrated (a minor issue).
- Soil runoff, storage, and topography are averaged over a grid unit. Model grid size varies among the watershed models currently completed, so the ability of each model to represent the landscape varies too. The PRIM model used a grid size of 2,500 x 2,500 feet (about 143 acres, or $\frac{1}{4}$ square mile [mi^2]) and the upper Myakka model grid size is about 410 x 410 feet (about 4 acres) in size. The upper Myakka River model report (Interflow, 2008a) stated that the MIKE SHE model grid size is not feasible for larger watersheds because of the run times and volume of result data generated. Consequently, small landscape features, like isolated wetlands, are averaged in an Integrated Model grid cell.
- Land use does not change in a computer model over time. A model is set up with one land use/soil characterization and then multiple years of precipitation are simulated. Therefore, multiple simulations are required to estimate the runoff for various land uses (mining scenarios). This is no different from any of the other approaches discussed below. Consequently, there is not an inherently different approach for representing the change of land use in integrated models that would represent the dynamic changes occurring to the landscape over the life of the mines.
- Land use is entered via a geographic information system (GIS) format, and future land use is not available in this format. Future topography in a GIS format is also not available and one would have to assume no major changes to existing aerial topographic data (i.e., light detection and ranging, [LiDAR]) or create new

landscapes for post-mining conditions. CF Industries included a post-reclamation landscape terrain in its permit application.

- Even if new models were developed, there would be a high level of uncertainty given the speculative basis for predicting land use change and rainfall out 50 years. Additionally, developing and finalizing new models, including recalibration, peer review, and production runs, would likely extend the AEIS schedule at least 3 to 5 years. In summary, the previously developed integrated models were not available to the AEIS team, it would take significant work to adapt them for the AEIS evaluation, and the degree of uncertainty in the results would remain high. The uncertainty associated with future land use changes would apply to any approach selected.
- These types of models are very resource-intensive to run; computer run times are long, about 12 to 16 hours per year simulated. Massive data and result files are generated and considerable effort is required to reduce results into formats that may be useful.

2.2.2 Dynamic Models

(Examples: SWIM, ICPR)

- Dynamic models are primarily used to route stormwater through a system of pipes, streams, and rivers with a higher confidence in peak flow rates and stages. These programs are often used for storm event simulations, but can be used for longer precipitation records (i.e., continuous time series simulation). The hydrology prediction algorithms used for a continuous simulation are often different than those used for storm event modeling. Long-term simulations require calibration and verification of runoff rates and volumes for application to projects.
- There is a need to average (lump) parameters to the subwatershed level for input. Stage storage relationships are needed for each subwatershed (LiDAR could be used for some of this). Cross section data, of at least the river and stream crossings, are also required input and LiDAR data are normally not sufficient for these inputs. SWFWMD guidelines for watershed models require delineation into very small contributing subwatersheds and a substantial amount of data for input. (These subwatershed areas are still typically larger than the grids in Integrated Models.)
- Dynamic models are resource-intensive to develop; less so than integrated models, but could take at least 2 to 3 years to develop. Previous SWMM models may have been prepared for the Peace River Cumulative Impact Analysis, but new models are required to be developed for the entire Myakka River watershed and for the future mines.
- These models are resource-intensive to run; computer run times are long, about 3 to 6 hours per year simulated. In highly detailed models (i.e., small subwatersheds and many channels), run times could take twice this estimate to execute.

2.2.3 Continuous Watershed Models

(Examples: HSPF, SWAT)

- This class of models uses simpler flow routing to move water through the watershed. Stage storage relationships are needed for each subwatershed (LiDAR could be used for some of this). Input requires cross section data of, at least, some of the rivers and streams. SWFWMD guidelines for hydrologic models require very small subwatersheds and a considerable amount of data to use as input. The AEIS team may be able to relax some of the data requirements with the simpler routing methods.
- Land use data are not available out 50 years. Similar to the other approaches, input to these models averages parameters to the subwatershed level.
- These models still require model development and calibration, both of which are resource-intensive. This could take up to 1.5 to 2 years to develop fully for the AEIS project.

- These models are less resource-intensive to run simulations; run times range from about 4 to 8 hours per 3 to 5 years simulated.

2.2.4 Steady-State Models

(Examples: PLOAD, U.S. Environmental Protection Agency [USEPA] Simple Method)

- Several models could be applied, but they are very similar to the runoff coefficient approach used in the USEPA Simple Method. The main difference is how the coefficients are estimated. (Note, the Rational Method is not a water yield computation; it is used only to predict peak flow rates and the equation parameters are defined differently.)
- Similar to the other approaches, input to these models averages parameters to the subwatershed level.
- A variation of USEPA's Simple Method was applied to Charlotte Harbor pollutant load estimates. The runoff coefficient was developed based on observed data from multiple gages in the region. Both wet and dry season coefficients were developed.
- These types of models have been used to evaluate flow impacts throughout the nation, especially where there flow gage data are available. USEPA supports the model for pollutant load computations and it is a widely accepted approach in the NPDES stormwater program.
- These types of models can be implemented on a spreadsheet; however, large spreadsheets can be cumbersome. The method can utilize GIS queries to combine the soils and land use data and then export those data to the computation sheets. These models can also manipulate the effects of mining by adjusting coefficients on a subwatershed scale.
- The computation is direct (no numerical approximation) and can be done within a few hours after the sheet is set up. This approach requires approximately 2 to 3 months of effort to extract the data, set up the sheets, and prepare the output.

While some of the permit applications for mining include detailed hydrologic computer modeling results for pre- and post-mining conditions, the AEIS needs to apply estimated land use and weather patterns for up to approximately 50 years into the future with the various mines in different stages of active mining. Given the summary described above, detailed hydrologic computer modeling was not viewed as an appropriate technical approach, primarily because the inputs are highly uncertain. Rather, a method for making long-range predictions was developed using relevant existing literature and publicly available GIS data with the runoff coefficient approach with specific assumptions applied to account for the active mines (discussed in Section 2.6 and in Section 4). While this approach may not account for small-scale or short-duration hydrologic processes with high precision, the overall results achievable are appropriate for a large-scale, long-term predictive assessment of the watershed and major tributaries like what was needed to support the USACE AEIS.

2.3 Runoff Calculation Method Overview

The approach adopted for the AEIS evaluations is based on the one used for a recent analysis of pollutant loading to the Charlotte Harbor Estuary performed on behalf of the Charlotte Harbor National Estuary Program (CHNEP) by Janicki Environmental, Inc. (Janicki; 2010). The evaluations conducted for the CHNEP combined the hydraulic evaluations of watershed runoff with water quality information to generate pollutant load estimates. For the AEIS evaluations, the method adopted was based on the hydraulic aspect of the overall pollutant loading analysis. This methodology was also applied for the Tampa Bay Estuary Program (as stated in Janicki, 2010). This approach was favored because the coefficients were calibrated using recent data throughout the same region as the AEIS. The runoff coefficient computations could be executed with commonly available spreadsheets utilizing readily available GIS data.

Runoff amounts resulting from the rainfall on the land are calculated taking into account a combination of factors, including: watershed and subwatershed boundaries (acreages), land uses, and soil hydrologic groups. The combination of land use and soil types can be used to develop land use-specific runoff coefficients. Janicki (2010)

developed the runoff coefficients from USGS gage data utilizing monthly unit runoff rates (cubic feet per second per square mile [cfs/m]) divided by monthly precipitation (inches per month). Using land use coverage and literature values as a start, the runoff coefficients were varied to achieve a relatively good fit of the predicted runoff to the reduced observed data; the report stated that the correlation coefficient (r^2) was 0.87. As noted above, the data utilized incorporated current effects of existing mining so the capture and delayed release, or losses, associated with phosphate mining are implicitly included in the calibration of the runoff coefficients. Specific coefficients for mining land use were developed in this report.

For any given watershed, the flow for a given seasonal or annual period can be calculated by applying the equation:

$$Q = C_d * A * P * j * k$$

This equation is part of a pollutant load equation, sometimes called the USEPA Simple Method, as discussed above, is the one often used to predict the runoff component of pollutant loading estimates. For this equation:

Q is the flow in cubic feet per second (cfs),

C_d is the runoff coefficient for the contributing subwatershed,

A is the drainage area that contributes flow to the gaged location,

P is the total precipitation during the analysis frequency (annual or seasonal),

j is the long-term hydrologic adjustment factor, and

k is a factor applied for units conversion.

The runoff coefficients developed by Janicki (2010) for land areas tributary to the Charlotte Harbor Estuary were divided into wet and dry season C_d values. The CHNEP analysis estimated C_d as a function of cfs/m/inches-precipitation per month. To report this value in inches of runoff per inch of precipitation, a unit conversion factor of 1.115 is required. The soil and land use are used to select an appropriate C_d . This is described in more detail below.

For the Peace and Myakka River watersheds, the average rainfall totals were 50 and 53 inches per year (in/yr), respectively. In addition to the average year, a dry year was also simulated. This value was taken as the low 20th percentile value (i.e., 80 percent of the annual rainfalls exceed this value³), or 43 in/yr for both Peace and Myakka River watersheds. The low rainfall value is approximately the same condition used by the SWFWMD to permit agricultural water use. The rainfall data are provided in Attachment A, and P20 values are the 20th percentile rankings. Seasonal values are determined by summing the monthly precipitation values during the respective wet (June through September) and dry seasons.

The USGS maintains flow recording gages at or near the downstream ends of each of the major tributary subwatersheds shown in Figures 1 and 2. The runoff calculation method applied in the AEIS was calibrated to the subwatersheds of interest by using historical rainfall records and GIS-based data regarding AEIS study area⁴ subwatershed boundaries (and acreage), soil hydrologic types, land use information, and land use-specific runoff coefficients to calculate annual flows in five subwatersheds defined by the USGS gage stations (Janicki, 2010). The referenced long-term hydrologic adjustment factor in the governing equation was used as a calibration term in the AEIS runoff estimation approach to improve the estimates of the specific subwatersheds in the AEIS study area. In general, j is used to account for a variety of influences on the retention and storage volume within a watershed (for example, either in lakes and reservoirs or in the subsurface soil layers) and it varies between subwatersheds and with rainfall amount (i.e., wet year or season versus dry year or season). The unit conversion factor described above

³ Different reports use the percentiles in opposite ways. Sometime a 10th percentile represents the highest 10 percent (Garlanger, 2002), while others use the 10th percentile to represent the low flows (HGL, 2012a). The P20 nomenclature in Attachment A generally follows the EXCEL function for reporting the lowest 20th percentile value.

⁴ As mentioned earlier, the AEIS study area for the surface water evaluation was limited to the Peace and Myakka River Watersheds, not the entire CFPD.

(1.115) was incorporated in the j adjustment factor in the calibration effort, and the k unit conversion factor then just included factors to convert the runoff equation from acres-inches per year to predict flow in cfs.

The analytical method was tested against gaged flows within the Peace River and Myakka River subwatersheds to validate this empirical approach for the AEIS evaluations and to derive the adjustment factors per subwatershed. Section 2.4 describes information used to support the method development. Method validation results are summarized in Section 2.5.

2.4 Data Sources and Key Assumptions Supporting the Surface Water Analysis

The following sections address the watershed-based historical rainfall and flow records, land use GIS coverages, hydrologic soils data, and land use-specific runoff coefficients used to support this AEIS surface water analysis.

2.4.1 Rainfall

Precipitation regimes of southwest Florida are largely dominated by a summer wet season (June through September) when more than 60 percent of annual precipitation occurs due to local convective-type thunderstorm activity (Basso and Schultz, 2003). During the summer, tropical storms and hurricanes may also affect the region with extremely heavy rain and wind. During the remainder of the year, weather patterns are dominated by mid-latitude frontal systems and there is significantly less rainfall. On average, the wettest month in the region is July and the driest month is November. However, the rainfall record is highly variable and any given month could have a relatively high rainfall total or a drought period (see maximum and minimum monthly totals in Attachment A).

Surface water runoff is affected by rainfall variation, the time of year when rainfall occurs, and previous months' moisture conditions. Hydrologically, the landscape is driest (including the SAS) during May and into early June, just before the beginning of the summer rainy season when the previous months' precipitation is low and the early summer evapotranspiration (ET) rate is high. The months of September and October, at the end of the summer rainy season, are generally when hydrologic systems reach their annual peaks (flows and levels of both surface and groundwater systems) resulting from higher rainfall and full water storage on and below the ground surface. The month of June can be considered a transition month into the wet season and October a transition month into the fall dry season. Rainfall becomes most important in the runoff process during the months of June through October because of its magnitude, intensity, and the generally wet conditions during previous months. During the late summer rainy season, soil moisture content is highest, groundwater levels are closer to ground surface, and surface storage within the watershed decreases (for example, in wetlands and soils). This results in higher percentages of rainfall contributing to runoff and to surface water levels.

In the analytical approach development effort, the period of record chosen for calibrating the adjustment factor was related primarily to the availability of reliable data for land uses. The precipitation used for the AEIS was based on SWFWMD's rainfall database, reported by county, between 1985 and 2011 for the calibration period. Figures 4 and 5 present wet and dry season as well as annual total rainfall amounts for the Peace River and Myakka River watersheds, respectively, as summarized by the SWFWMD per the USGS drainage watersheds (SWFWMD, 2012b; see Attachment A). Normally, about 60 percent of the rainfall occurs in the wet season, which is 40 percent of the year, and there is a little more rainfall closer to the coast. As noted previously, the Peace and Myakka River watersheds have average rainfall amounts of 50 and 53 in/yr, respectively.

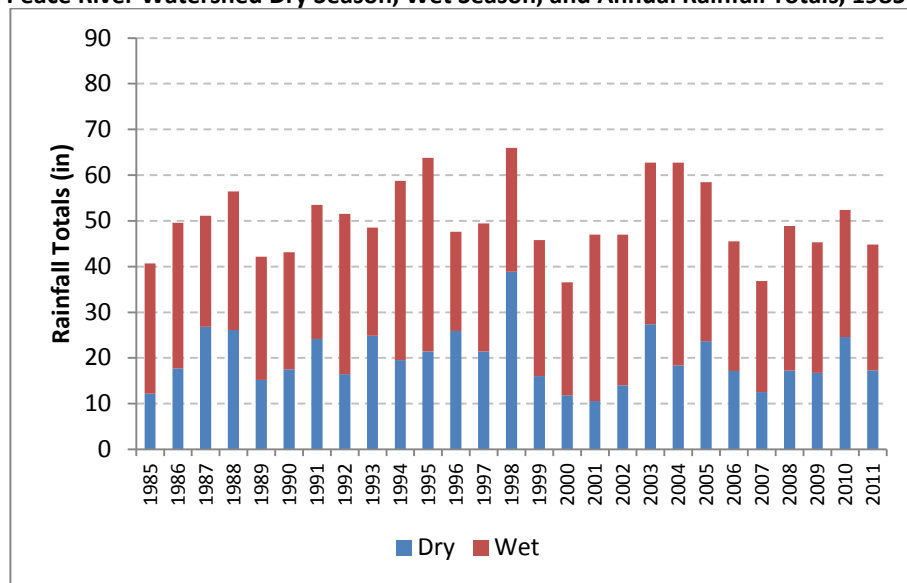
2.4.2 Watershed and Subwatershed Boundaries

The Peace and Myakka River watersheds are divided into distinct subwatersheds defined by tributary streams and river reaches often defined by USGS gage stations. These subwatersheds were generally those used in previous reports, like the previous Cumulative Impact Studies (PBS&J, 2007 and SWFWMD, 2001b) and other hydrologic characterization reports (Lewelling and Wylie, 1993; Schreuder, Inc. [Schreuder], 2006). GIS-based data were also obtained through the USGS portal (Natural Resource Conservation Service [NRCS], 2013). The Peace River watershed is divided into nine distinct subwatersheds (see Figure 1). Of these nine, eight have USGS gage stations that measure flow continuously. Figure 6 presents a diagram of the gaged subwatersheds that contribute flow to

the Peace River and Charlotte Harbor. The flow ranges and periods of record are from the Peace River Basin Cumulative Impact Study (PBS&J, 2007), but these gages continue to collect flow data.

FIGURE 4

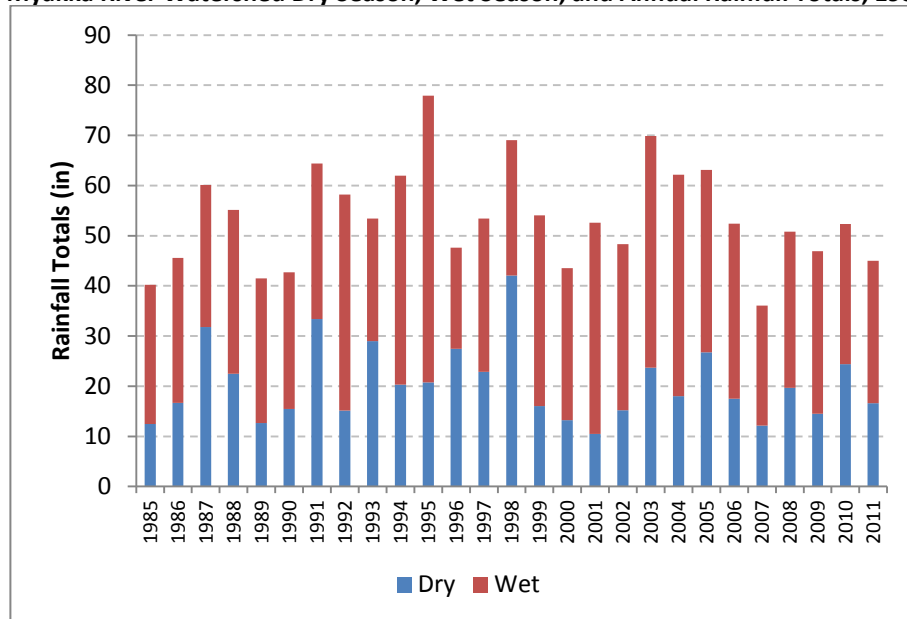
Peace River Watershed Dry Season, Wet Season, and Annual Rainfall Totals, 1985-2011



Source: SWFWMD, 2012

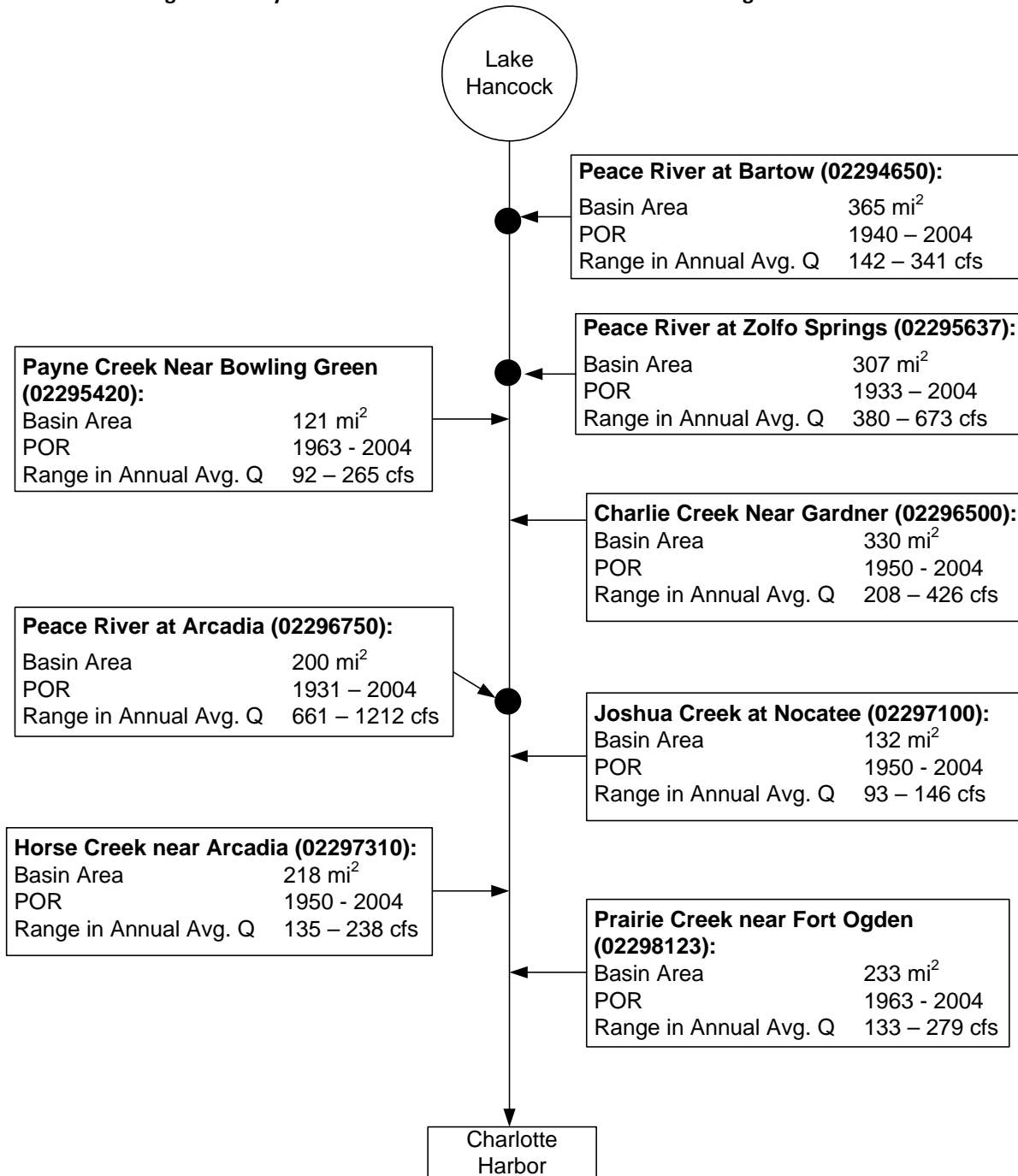
FIGURE 5

Myakka River Watershed Dry Season, Wet Season, and Annual Rainfall Totals, 1985-2011



Source: SWFWMD, 2012

FIGURE 6

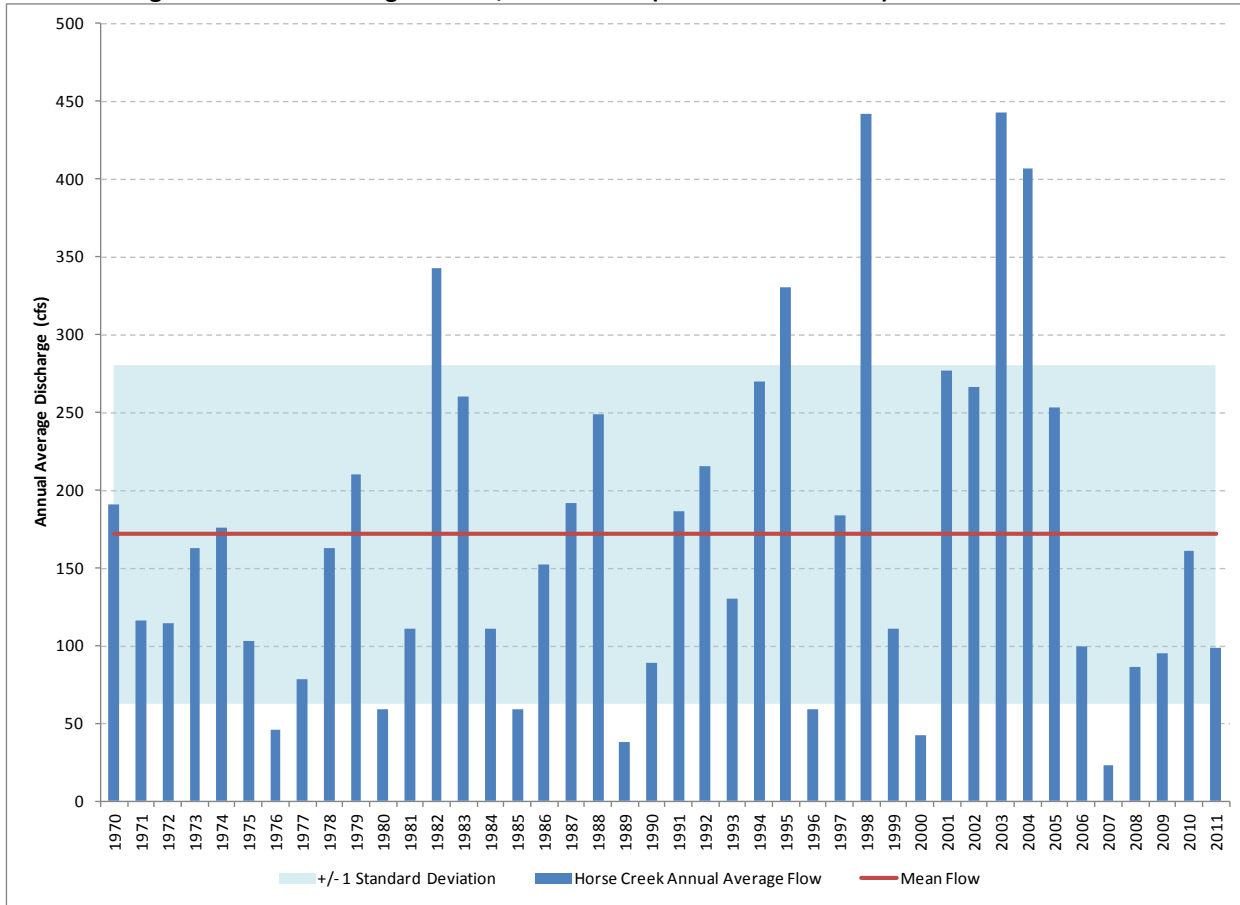
Historical Discharge Summary for Peace River Subwatersheds at USGS Flow Gage Stations

Data Source: PBS&J, 2007

As noted previously, because the Applicants' Preferred mine sites are primarily within the Horse Creek, Peace River at Arcadia, and upper Myakka River subwatersheds, the calibration effort discussion is focused on flows at these gage stations. The flow information from gage stations was downloaded from USGS databases, summarized, and used to calibrate the runoff coefficient approach for calculating stream flow within each subwatershed. The period of record used to illustrate annual flow conditions in each watershed is from 1970 through 2011 in Figures 7 through 9 that summarize annual average flows for the Horse Creek, Peace River at Arcadia, and upper Myakka River gages, respectively. These figures also illustrate the mean flows for the period of record and one standard deviation above and below the mean flows (reflected by the blue shaded areas).

FIGURE 7

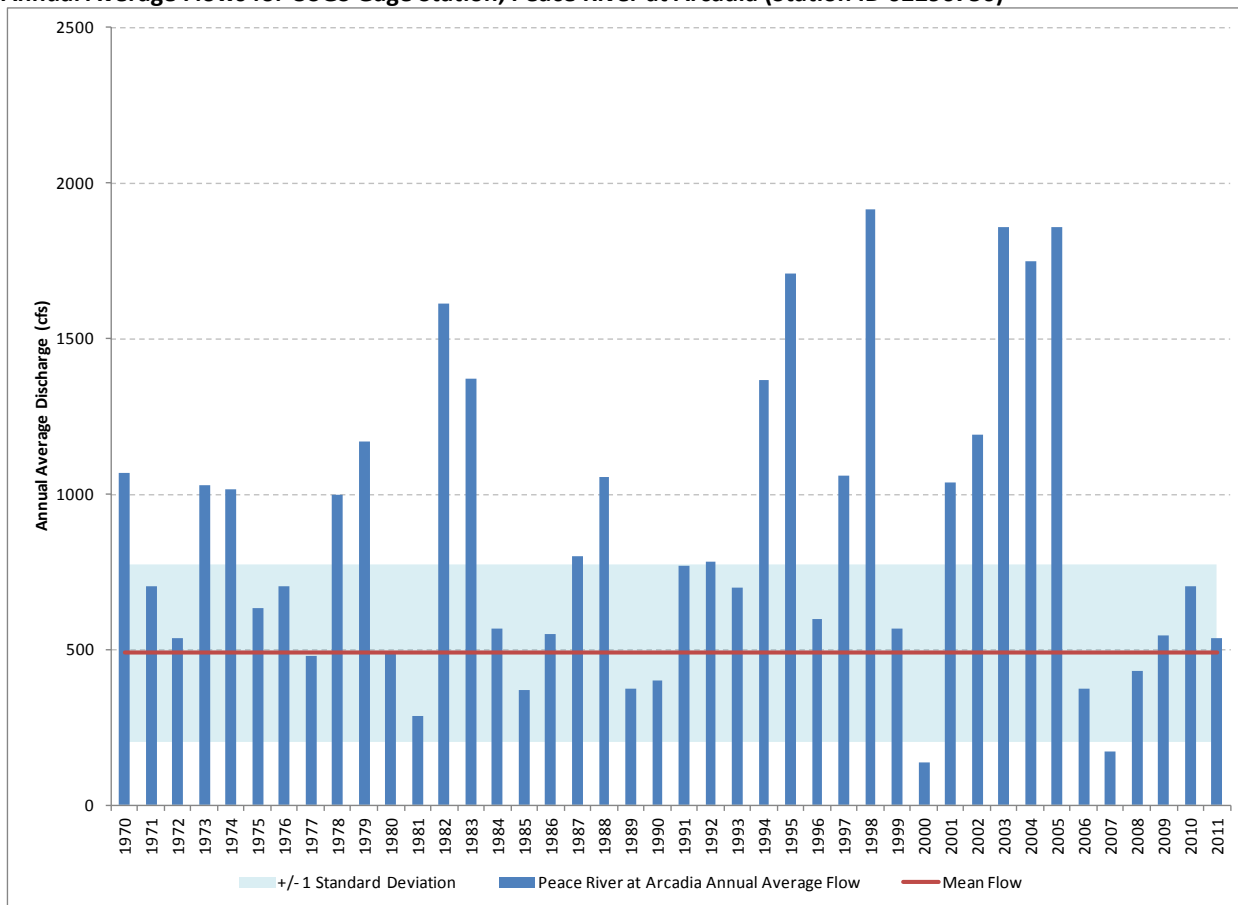
Annual Average Flows for USGS Gage Station, Horse Creek (Station ID 02297310)



Source: USGS, 2012b

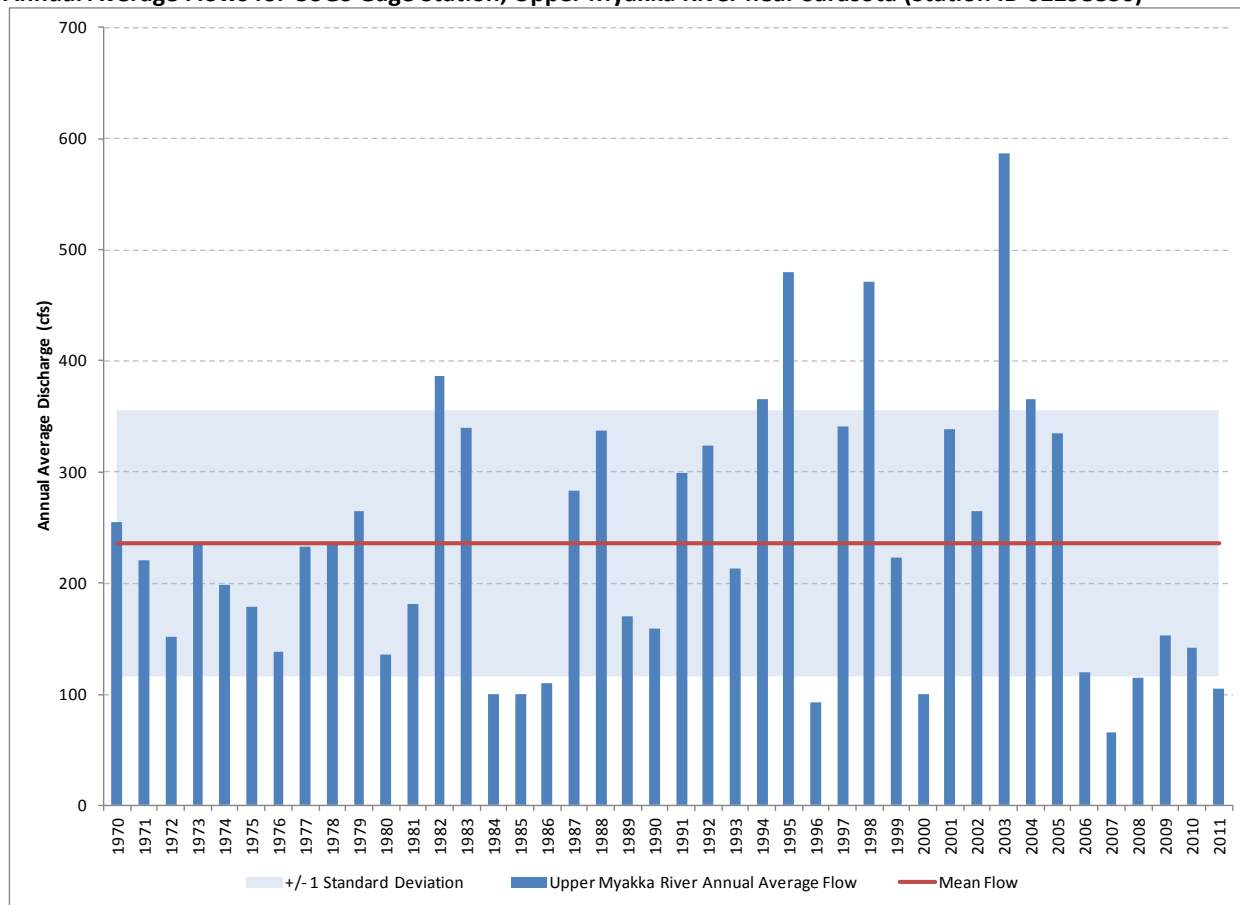
FIGURE 8

Annual Average Flows for USGS Gage Station, Peace River at Arcadia (Station ID 02296750)



Source: USGS, 2012b

FIGURE 9

Annual Average Flows for USGS Gage Station, Upper Myakka River near Sarasota (Station ID 02298830)

Source: USGS, 2012b

During the period of record (1970 through 2011), significant flow variations occurred at each of these stream gauging locations. The periods of low and high flow correlate well between these gages and also correlate well with the rainfall totals for those years. This illustrates that these streams can be considered predominantly rainfall-driven systems, as others have also indicated (Basso and Schultz, 2003; HGL, 2012c). One standard deviation above and below historical mean flow is presented to show a reasonable range of historical variation in stream flow. A standard deviation range contains approximately 67 percent of the observations in a normal distribution. A log-transformation was examined to determine whether it would yield a different result, which it did not in this case. One standard deviation was selected to use in the plots to show a relative range of flow because larger statistical ranges often reported (e.g., 90 or 95 percent) are so large; the plots would just appear to have a blue background.

2.4.3 Land Uses

The 1990, 1999, and 2009 Florida Land Use, Cover and Forms Classification System (FLUCCS) data were acquired from SWFWMD for the most recent and accurate data related to land use within the areas of interest. The trends in land use changes over this time period were examined and used to help establish future conditions (see Section 3.0). Level 4 descriptions were used in the AEIS to correlate the land use to runoff coefficients used in the CHNEP report (Janicki, 2010), although less detailed Level 1 data have been used by others when simulating these watersheds using complex hydrologic models (Lee et al., 2010; Interflow, 2008b; Evans, 2010).

The Level 4 FLUCCS description and its correlation with the land uses described in the CHNEP Pollutant Loading Report (Janicki, 2010) are presented in Table 1. Figure 10 presents the FLUCCS 2009 coverage within the CFPD as an illustrative example of these data.

TABLE 1

Land Use Description Correlation with CHNEP Pollutant Loading Report

FLUCCS Code	FLUCCS Description	CHNEP Pollutant Loading Land Use Description
1100	Residential Low Density	Single Family Residential
1200	Residential Medium Density	Medium Density Residential
1300	Residential High Density	Multifamily Residential
1400	Commercial and Services	Commercial
1480	Upland Forested Land Use	Range Lands
1500	Industrial	Industrial
1600	Extractive	Mining
1700	Institutional	Institutional, Transportation, Utilities
1800	Recreational	Range Lands
1820	Golf Courses	Range Lands
1900	Open Land	Range Lands
2100	Cropland and Pastureland	Agricultural - Row and Field Crops
2110	Improved Pastures	Agricultural - Pasture
2140	Row Crops	Agricultural - Row and Field Crops
2150	Agricultural Land Use	Agricultural - Row and Field Crops
2120	Unimproved Pastures	Agricultural - Pasture
2130	Woodland Pastures	Agricultural - Pasture
2200	Tree Crops	Agricultural - Groves
2210	Agricultural Land Use	Agricultural - Groves
2230	Agricultural Land Use	Agricultural - Groves
2300	Feeding Operations	Agricultural - Feedlots
2400	Nurseries and Vineyards	Agricultural - Nursery
2420	Upland Forested Land Use	Range Lands
2440	Agricultural Land Use	Agricultural - Row and Field Crops
2500	Specialty Farms	Freshwater - Open Water
2540	Aquaculture	Freshwater - Open Water
2550	Water and Wetlands	Freshwater - Open Water
2600	Other Open Lands <Rural>	Range Lands
3100	Herbaceous	Range Lands
3200	Shrub and Brushland	Range Lands
3300	Mixed Rangeland	Range Lands
4100	Upland Coniferous Forest	Upland Forests
4110	Pine Flatwoods	Upland Forests

TABLE 1

Land Use Description Correlation with CHNEP Pollutant Loading Report

FLUCCS Code	FLUCCS Description	CHNEP Pollutant Loading Land Use Description
4120	Upland Forested Land Use	Upland Forests
4200	Upland Hardwood Forests	Upland Forests
4300	Upland Hardwood Forests	Upland Forests
4340	Hardwood Conifer Mixed	Upland Forests
4400	Tree Plantations	Upland Forests
5100	Streams and Waterways	Freshwater - Open Water
5200	Lakes	Freshwater - Open Water
5210	Lakes larger than 500 acres	Freshwater - Open Water
5220	Lakes larger than 100 acres	Freshwater - Open Water
5230	Lakes larger than 10 acres	Freshwater - Open Water
5240	Lakes less than 10 acres	Freshwater - Open Water
5300	Reservoirs	Freshwater - Open Water
5310	Reservoirs larger than 500 acres	Freshwater - Open Water
5320	Reservoirs larger than 100 acres	Freshwater - Open Water
5330	Reservoirs larger than 10 acres	Freshwater - Open Water
5340	Reservoirs less than 10 acres	Freshwater - Open Water
5400	Bays and Estuaries	Saltwater - Open Water
5500	Major Springs	Freshwater - Open Water
5600	Slough Waters	Freshwater - Open Water
6100	Wetland Hardwood Forests	Forested Freshwater Wetlands
6110	Bay Swamps	Forested Freshwater Wetlands
6120	Mangrove Swamps	Saltwater Wetlands
6150	Stream and Lake Swamps	Forested Freshwater Wetlands
6200	Wetland Coniferous Forests	Forested Freshwater Wetlands
6210	Cypress	Forested Freshwater Wetlands
6240	Cypress-Pine-Cabbage Palm	Forested Freshwater Wetlands
6300	Wetland Forested Mixed	Forested Freshwater Wetlands
6400	Veg. Non-Forested Wetlands	Non-Forested Freshwater Wetlands
6410	Freshwater Marshes	Non-Forested Freshwater Wetlands
6411	Water and Wetlands	Non-Forested Freshwater Wetlands
6420	Water and Wetlands	Saltwater Wetlands
6430	Wet Prairies	Non-Forested Freshwater Wetlands
6440	Emergent Aquatic Vegetation	Freshwater - Open Water

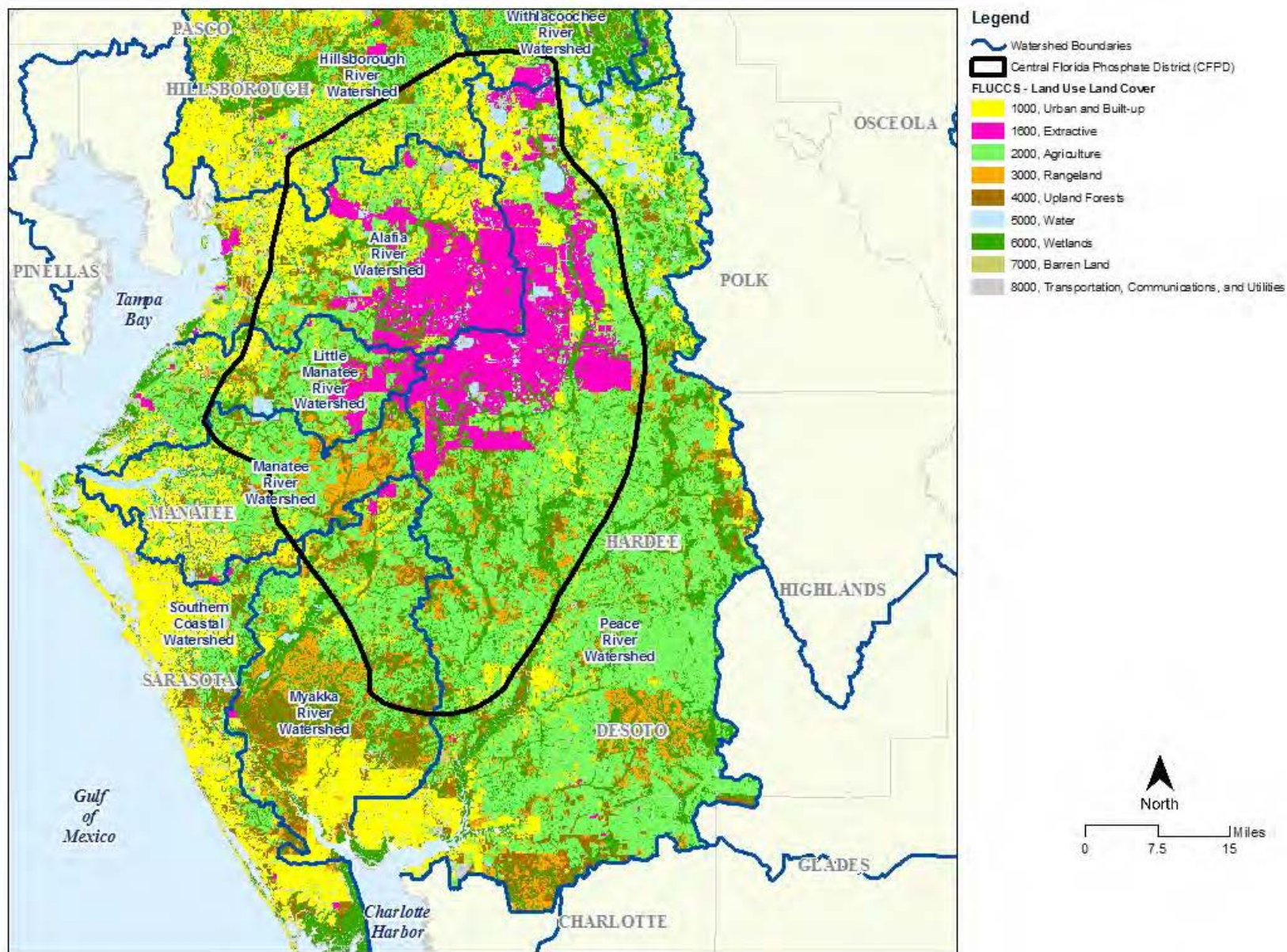
TABLE 1

Land Use Description Correlation with CHNEP Pollutant Loading Report

FLUCCS Code	FLUCCS Description	CHNEP Pollutant Loading Land Use Description
6450	Water and Wetlands	Freshwater - Open Water
6500	Non-Vegetated Wetlands	Tidal Flats
6510	Tidal Flats	Tidal Flats
6520	Shorelines	Tidal Flats
6530	Intermittent Ponds	Non-Forested Freshwater Wetlands
7100	Beaches other than for Swimming	Barren Lands
7200	Sand other than Beaches	Barren Lands
7300	Exposed Rock	Barren Lands
7400	Disturbed Lands	Barren Lands
8100	Transportation	Institutional, Transportation, Utilities
8200	Communications	Institutional, Transportation, Utilities
8300	Utilities	Institutional, Transportation, Utilities
9113	Sea Grass, Patchy	Saltwater - Open Water
9116	Water and Wetlands	Saltwater - Open Water
9121	Water and Wetlands	Saltwater - Open Water

CHNEP land use from Janicki, 2010

FIGURE 10
FLUCCS 2009 Land Use Map



Source: SWFWMD, 2009a

According to the most recent land use cover data (SWFWMD, 2009a), major land uses within the areas of interest in the Peace and Myakka River watersheds are *Urban and Built Up*, *Agriculture*, *Wetland*, and *Rangeland*. The Peace River watershed is composed of 42 percent *Agriculture*, 22 percent *Urban and Built Up*, and 19 percent *Wetlands*. Of the *Urban and Built Up* land use cover, approximately 45 percent is *Extractive* land use, which represents 10 percent of the entire Peace River watershed area. The Myakka River watershed is made up of 26 percent *Agriculture*, 23 percent *Wetlands*, 19 percent *Urban and Built Up*, and 13 percent *Rangeland*. Of the *Urban and Built Up* land use cover, approximately 5 percent is *Extractive* land use, which represents only 1 percent of the entire Myakka River watershed area. Extractive land use may include land that supports mining (e.g., factory, offices), other types of mines (e.g., sand), and land that is in various stages of reclamation and release; the extractive land use presented in the FLUCCS database is not just active phosphate mines.

2.4.4 Hydrologic Soil Groups

The U.S. Department of Agriculture NRCS characterizes and assesses soils for their runoff potential. This characterization is listed within four categories called their hydrologic soil groups. Hydrologic soil groups are characterized according to the water transmitting soil layer (that is, the surface layer of soil) and the depth to a seasonal water table, and are classified as A, B, C, or D. The soil types by hydrologic group layer were acquired from the NRCS and provided by the SWFWMD. Soils data in the database were mapped by the NRCS for the CFPD counties between 2000 and 2010.

Group A soils are characterized as having low runoff potential even when thoroughly wet, and where water is transmitted freely through the soil (i.e., no clayey restrictive layers). Group A soils typically have less than 10 percent clay and more than 90 percent sand or gravel and have gravel or sand textures. Group B soils are characterized as having moderate to low runoff. Group B soils typically have between 10 percent and 20 percent clay and 50 percent to 90 percent sand, and have loamy sand or sandy loam textures. Group C soils are characterized as having moderate to high runoff potential. Group C soils typically have between 20 percent and 40 percent clay and less than 50 percent sand, and have loam, silt loam, sandy clay loam, clay loam, and silty clay loam textures. Group D soils are characterized as having high runoff potential. Group D soils typically have greater than 40 percent clay, less than 50 percent sand, and clayey textures.

Some soils have combined A/D, B/D, or C/D soil group assignments. These soils have top layers that respond like the first letter when drained or dry, but have high runoff potential (Group D) when wet, normally because of high water table levels and/or restrictive flow layers. By standard practice and convention, dual groups are assumed to be Group D soils for design and permitting. However, for characterizing long-term runoff, this assumption may be too conservative, particularly in a subwatershed where interaction with groundwater is known to vary because of fluctuations in groundwater levels. For the AEIS, combined soil groups are assumed to be the initial hydrologic group (e.g., A/D were assigned A) for consistency. Otherwise, if all of the combined soils were reassigned D soils, there was less difference in the landscape and the results of the analytical approach did not match the observed gage data as well.

Table 2 presents the acreage and percent of area for each soil hydrologic group for the Peace and Myakka River watersheds. A soil hydrologic group map is presented in Figure 11 for the entire CFPD. The CFPD is categorized by having mostly sandy well-drained soils, which contribute less to runoff and surface water flows and more to infiltration, surficial aquifer interflow, and groundwater deep recharge. This is especially true in the northern portion of the CFPD with the A soils, while there are more combined groups (e.g., B/D) soils in the south. The predominant soil hydrologic groups in the CFPD are Groups A and A/D, with 30 percent and 38 percent cover, respectively. Only 5 percent of the CFPD is Group D soils, which are often associated with depressional wetlands. The coverages of B/D and C/D soils are 12 percent and 11 percent, respectively.

In the Peace River watershed, the predominant soil group is A/D, with a total cover of 49 percent. Although these are sandy soils, they are characterized as having high groundwater levels. Group A covers approximately 18 percent of the Peace River watershed. Groups B, C, and D cover only 1 percent, 0.1 percent, and 2 percent of the watershed, respectively. Groups B/D and C/D cover 15 percent and 10 percent, respectively.

In the Myakka River watershed, the predominant soil group is A/D with a total cover of 63 percent, followed by Group C/D with a total cover of 25 percent. Group A has only 6 percent coverage. With this distribution of hydrologic groups, this watershed is also characterized as having a high groundwater table and the potential for significant presence of wetlands. The runoff potential for the Myakka River watershed is high.

TABLE 2

Acreage and Percent Soil Hydrologic Groups Cover for CFPD, Peace River and Myakka River Watersheds

Hydrologic Soil Groups	Peace River Watershed		Myakka River Watershed	
	Acres	% Cover	Acres	% Cover
A	274,178	18%	21,824	6%
B	9,605	1%	2,546	1%
C	939	0.1%	0	0%
D	36,763	2%	57	0%
A/D	730,469	49%	238,021	63%
B/D	227,008	15%	17,537	5%
C/D	149,553	10%	92,909	25%
OTHER	60,452	4%	4,433	1%

Source: NRCS, 2000-2010

2.4.5 Land Use-Specific Runoff Coefficients

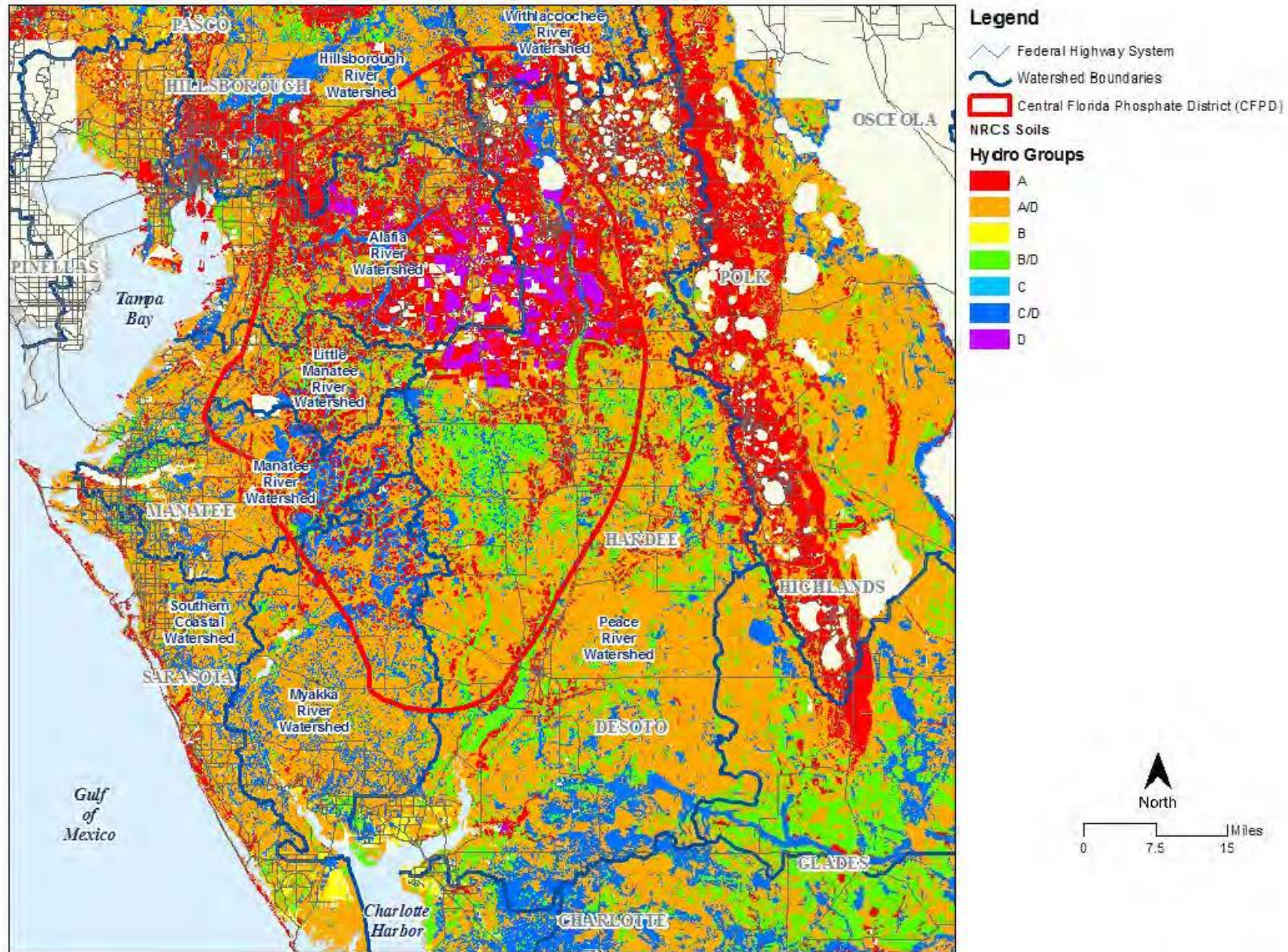
The calibrated land use-specific runoff coefficients developed by Janicki (2010) for the CHNEP pollutant loading evaluations are pertinent in that they defined soil type- and season-specific runoff coefficients for land areas tributary to the CHNEP study area, which includes the AEIS study area. In the CHNEP pollutant loading evaluations, the seasonal land use-specific runoff coefficients shown in Table 3 were calibrated and used to describe runoff from unmetered streams within lands tributary to the Charlotte Harbor Estuary. Their loading estimates relied on the observed USGS gage data for most of the watershed. In the AEIS analysis, the runoff coefficients were used for the entire watershed so future conditions could be addressed in a consistent manner.

2.5 Method Validation Results

2.5.1 Calculations of Flows for Each Watershed

Utilizing the information presented above, flow calculations for each subwatershed in the Peace and Myakka River watersheds were performed using the runoff coefficient method. GIS coverage of land uses for 1990, 1999, and 2009 was overlaid with GIS coverage of soil hydrologic groups to create unique polygons of a known area that have a single land use type and soil hydrologic group. Each polygon was then assigned a runoff coefficient from Table 3. With these data, an area-weighted average runoff coefficient for 1990, 1999, and 2009 was calculated for each subwatershed for both wet and dry seasons. Rainfall and USGS gage flow records from 1985 through 2011 were used to calculate average annual runoff for this period of record. Land use was reassigned every 10 years, so there is a stair-step change to the Cd values. Cd values were adjusted according to changes in land use based on the SWFWMD FLUCCS data for 1990, 1999 and 2009, where 1990 data were applied to 1985 through 1995, 1999 data were applied to 1996 through 2005, and 2009 data were applied to 2006 through 2011. To adjust the AEIS water balance approach to observed flow records, the long-term hydrologic adjustment factor was varied to better represent the predictions of the observed data for each year.

FIGURE 11
Soils Hydrologic Group Map



Source: NRCS, 2000 - 2010

TABLE 3

Land Use-Specific Seasonal Runoff Coefficients for Lands Tributary to Charlotte Harbor Estuary

Land Use	Hydrologic Soil Group	Dry Season Runoff Coefficient	Wet Season Runoff Coefficient
Single Family Residential	A	0.15	0.25
	B	0.18	0.28
	C	0.21	0.31
	D	0.24	0.34
Medium Density Residential	A	0.25	0.35
	B	0.30	0.40
	C	0.35	0.45
	D	0.40	0.50
Multifamily Residential	A	0.35	0.50
	B	0.42	0.57
	C	0.50	0.65
	D	0.58	0.75
Commercial	A	0.70	0.79
	B	0.74	0.83
	C	0.78	0.97
	D	0.82	0.91
Industrial	A	0.65	0.75
	B	0.70	0.80
	C	0.75	0.85
	D	0.80	0.90
Mining	A	0.20	0.20
	B	0.30	0.30
	C	0.40	0.40
	D	0.50	0.50
Institutional, Transportation, Utilities	A	0.40	0.50
	B	0.45	0.55
	C	0.50	0.60
	D	0.55	0.65
Range Lands	A	0.10	0.18
	B	0.14	0.22
	C	0.18	0.26
	D	0.22	0.30

TABLE 3

Land Use-Specific Seasonal Runoff Coefficients for Lands Tributary to Charlotte Harbor Estuary

Land Use	Hydrologic Soil Group	Dry Season Runoff Coefficient	Wet Season Runoff Coefficient
Barren Lands	A	0.45	0.55
	B	0.50	0.60
	C	0.55	0.65
	D	0.60	0.70
Agricultural – Pasture	A	0.10	0.18
	B	0.14	0.22
	C	0.18	0.26
	D	0.22	0.30
Agricultural – Groves	A	0.20	0.26
	B	0.23	0.29
	C	0.26	0.32
	D	0.29	0.33
Agricultural - Feedlots	A	0.35	0.45
	B	0.40	0.50
	C	0.45	0.55
	D	0.50	0.60
Agricultural - Nursery	A	0.20	0.30
	B	0.25	0.35
	C	0.30	0.40
	D	0.35	0.45
Agricultural - Row and Field Crops	A	0.20	0.30
	B	0.25	0.35
	C	0.30	0.40
	D	0.35	0.45
Upland Forests	A	0.10	0.15
	B	0.13	0.18
	C	0.16	0.21
	D	0.19	0.24
Freshwater - Open Water	A	0.80	0.90
	B	0.80	0.90
	C	0.80	0.90
	D	0.80	0.90

TABLE 3

Land Use-Specific Seasonal Runoff Coefficients for Lands Tributary to Charlotte Harbor Estuary

Land Use	Hydrologic Soil Group	Dry Season Runoff Coefficient	Wet Season Runoff Coefficient
Saltwater - Open Water	A	1.00	1.00
	B	1.00	1.00
	C	1.00	1.00
	D	1.00	1.00
Forested Freshwater Wetlands	A	0.50	0.60
	B	0.55	0.65
	C	0.60	0.70
	D	0.65	0.75
Saltwater Wetlands	A	0.95	0.95
	B	0.95	0.95
	C	0.95	0.95
	D	0.95	0.95
Non-Forested Freshwater Wetlands	A	0.45	0.55
	B	0.50	0.60
	C	0.55	0.65
	D	0.60	0.70
Tidal Flats	A	1.00	1.00
	B	1.00	1.00
	C	1.00	1.00
	D	1.00	1.00

Source: Janicki, 2010

The calculated flow results compared well to measured flows for the Horse Creek, Peace River at Arcadia, and upper Myakka River subwatersheds as presented in Figures 12 through 14, respectively. Some of the deviations may be related to tropical storm activity (especially in 2004) or unusual long-term wet conditions (1998). But even considering those years', the variability in the results was not unusual for hydrologic prediction. The long-term adjustment factors used for these subwatersheds are presented in Table 4. The long-term hydrologic adjustment factor decreased with lower rainfall years, which means that the conventional runoff coefficient approach is less accurate for lower rainfall years unless the adjustment factor is varied by annual rainfall too. The adjustment factor approaches the value of 1.0 as rainfall approaches or exceeds average rainfall conditions. Since the pollutant loading equation is usually applied for estimating average conditions, it is generally accurate when assumed to be approximately 0.9. The upper Peace River adjustment factor was found to have a lower value than at the other subwatersheds; this is attributed to the many lakes, Group A soils in the upper Peace River watershed, and active mines that would retain more surface water in dry years. The Horse Creek and upper Myakka River subwatersheds had soils with higher runoff potential and a lower fraction of active mines, so their adjustment factors were similar.

FIGURE 12

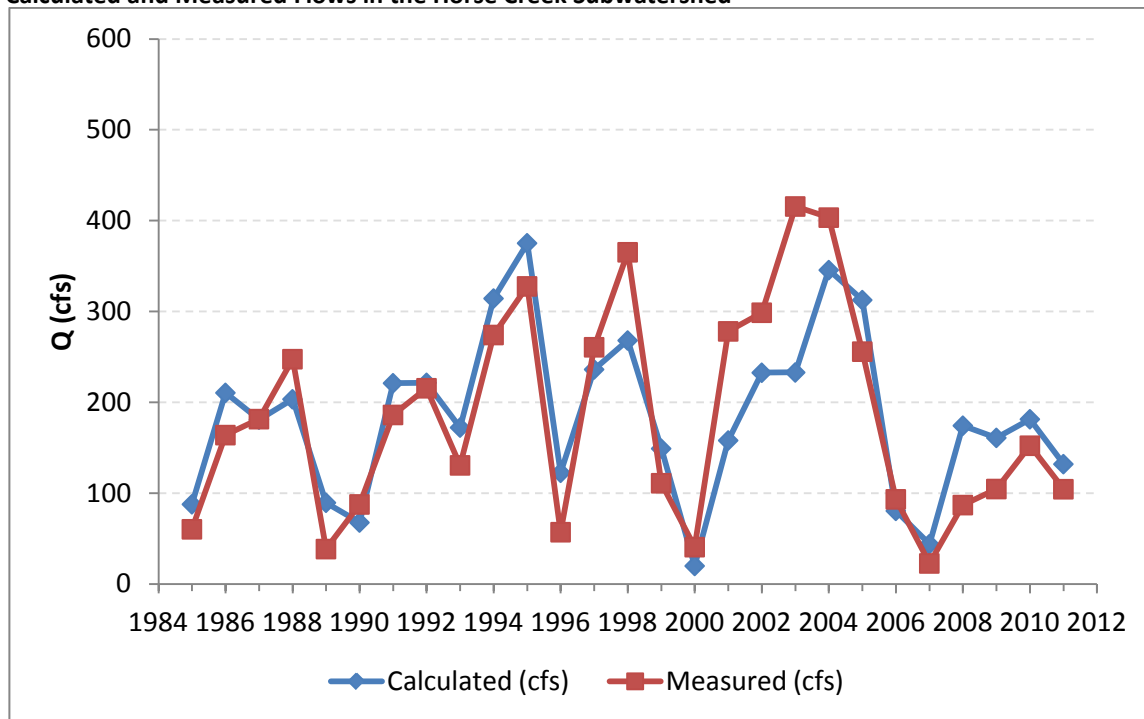
Calculated and Measured Flows in the Horse Creek Subwatershed

FIGURE 13

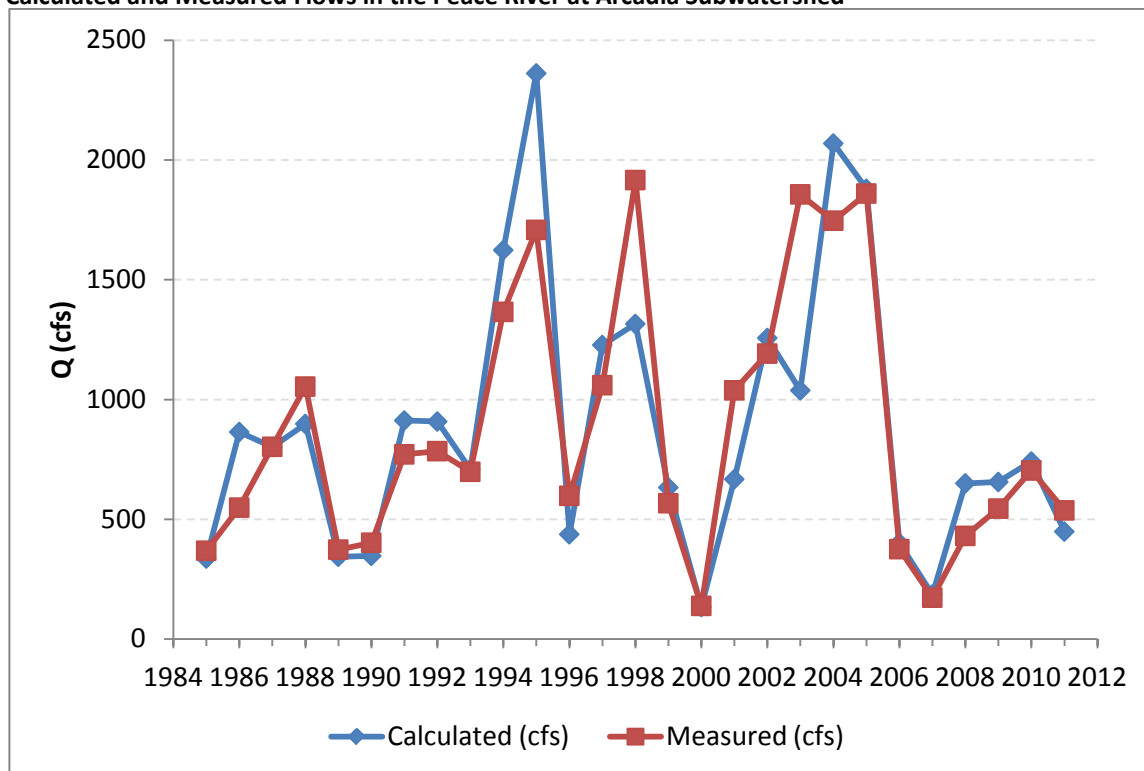
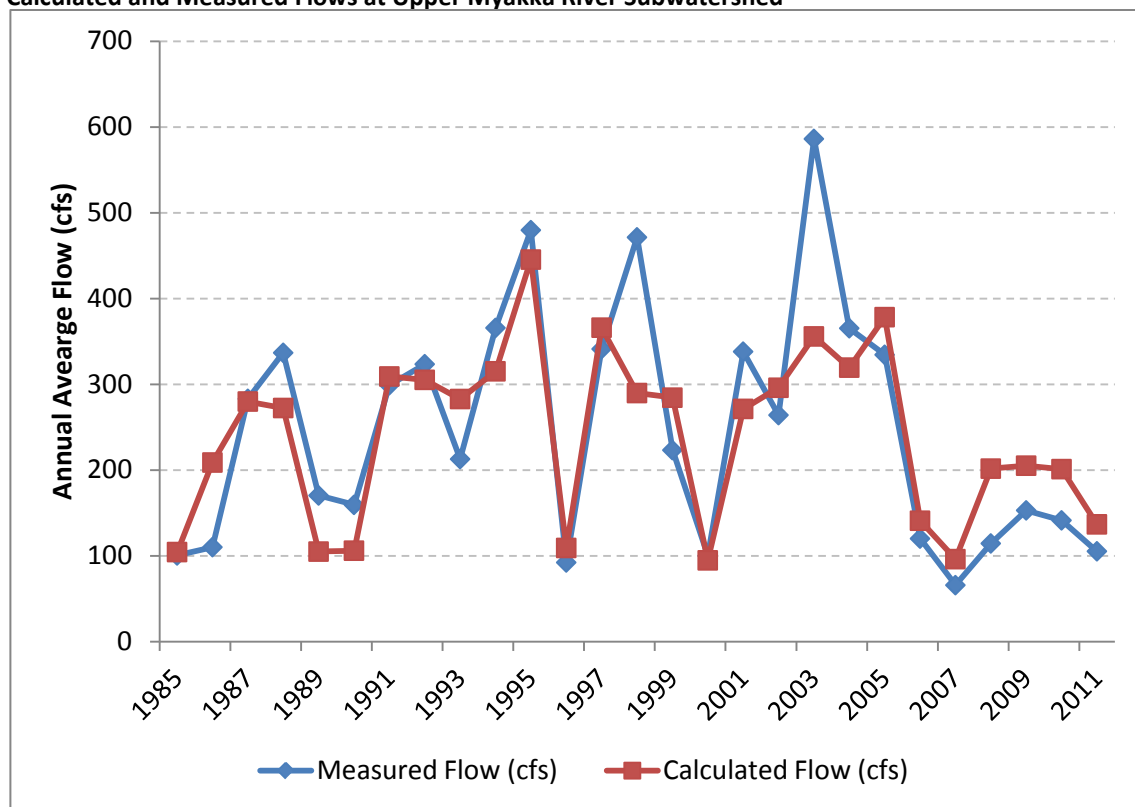
Calculated and Measured Flows in the Peace River at Arcadia Subwatershed

FIGURE 14

Calculated and Measured Flows at Upper Myakka River Subwatershed

(The highest measured flow reading in 2004 [an active hurricane season] at this gage appeared unusual when compared to other days and was perhaps estimated.)

TABLE 4

Long-Term Hydrologic Adjustment Factors (j) Applied to Better Represent the Annual Average USGS Gage Data Using Runoff Coefficients

Rainfall (in)	PR nr Bartow	PR nr Zolfo	PR nr Arcadia	Payne Ck	Charlie Ck	Joshua Ck	Horse Ck	Prairie Ck
30	0.05	0.1	0.1	0.1	0.1	0.3	0.1	0.2
36	0.05	0.2	0.1	0.3	0.2	0.5	0.2	0.2
39	0.1	0.3	0.2	0.4	0.3	0.6	0.3	0.3
40	0.1	0.3	0.2	0.5	0.3	0.6	0.3	0.3
41	0.1	0.3	0.2	0.5	0.3	0.6	0.4	0.3
43	0.1	0.3	0.2	0.6	0.4	0.7	0.4	0.3
44	0.1	0.4	0.2	0.6	0.4	0.7	0.5	0.3
47	0.2	0.4	0.3	0.7	0.5	0.8	0.6	0.4
48	0.2	0.5	0.3	0.7	0.5	0.8	0.6	0.4
49	0.2	0.5	0.3	0.8	0.5	0.8	0.6	0.4
50	0.2	0.5	0.4	0.8	0.5	0.9	0.7	0.4
51	0.3	0.5	0.4	0.9	0.6	0.9	0.7	0.5
52	0.3	0.5	0.4	0.9	0.6	0.9	0.7	0.5

TABLE 4

Long-Term Hydrologic Adjustment Factors (j) Applied to Better Represent the Annual Average USGS Gage Data Using Runoff Coefficients

Rainfall (in)	PR nr Bartow	PR nr Zolfo	PR nr Arcadia	Payne Ck	Charlie Ck	Joshua Ck	Horse Ck	Prairie Ck
53	0.3	0.6	0.4	0.9	0.6	0.9	0.8	0.5
55	0.4	0.6	0.5	1.0	0.7	1.0	0.8	0.5
58	0.5	0.7	0.6	1.1	0.8	1.1	0.9	0.6
59	0.6	0.7	0.6	1.1	0.8	1.1	0.9	0.6
60	0.6	0.7	0.7	1.2	0.8	1.1	1.0	0.7
62	0.7	0.8	0.8	1.3	0.9	1.2	1.0	0.7
65	1.0	0.8	0.9	1.4	1.0	1.3	1.1	0.8

Factors include a unit conversion.

Each column represents the USGS gage near the end of the tributary or river segment.

PR is Peace River; nr is near; and Ck is Creek.

By using the long-term adjustment factor as a calibration factor, the runoff coefficient water balance approach yielded reasonable results when compared to measured flow records. The mean error associated with this approach for estimating annual average flow in the Horse Creek, Peace River at Arcadia, and upper Myakka River subwatersheds for the periods of record analyzed ranged from 5 to 20 percent. Lee et al. (2010) calibrated a detailed MIKE-SHE model of Charlie Creek and reported a mean error of 57 percent for daily runoff estimates at the downstream end of the subwatershed for their 3 years of observed data. However, these modeled errors tend to be smaller when looking at annual totals. This calibration process validated that the runoff coefficient approach was appropriate for quantification of annual and seasonal surface runoff in the future for various land use changes. The adjustment factor was estimated for every subwatershed in the Peace and Myakka River watersheds where USGS gage data were available. For the ungaged areas near the southern end of the watersheds, the adjustment factor values in nearby subwatersheds were used.

2.5.2 Estimating Excess Precipitation at Active Mines

The runoff coefficient approach for estimating long-term runoff assumed constant values for mined land, given a soil type (Janicki, 2010). However, there is more information available from the applications that can be used to determine how the runoff potential varies throughout the life of each of the Applicants' Preferred Alternatives. For these mines, the following procedure was used to estimate runoff during active mining for the 50 percent capture case for comparison to the runoff coefficient method. This same procedure was used by the AEIS groundwater modeling team to estimate changes in recharge for the groundwater model. In this way, the two analyses are consistent in how the surface water on the Applicants' Preferred Alternatives is hydrologically accounted for.

The ditch and berm system collects rainfall and reuses it inside the active mines, as described above. One purpose of this system is to provide water for settling in the CSAs, which are essentially large settling ponds. The water stored onsite is subject to evaporation from open water or ET from the soil and cover. The open water evaporation rate is higher than ET rates. To estimate the relative amount of water available to storage in a year, a simple water balance was conducted to predict the excess precipitation (Excess P) on the active mine site as follows:

$$\text{Excess P} = \text{Annual P} - \text{ET} - \text{Net Recharge into SAS} - \text{River Cell Discharge}$$

Precipitation rates are about 50 in/yr and 53 in/yr in the Peace and Myakka River watersheds, respectively. The literature review indicated that the general mixed landscape has an average ET rate of about 36.9 in/yr. The SWFWMD groundwater modeling conducted to simulate the effect of deep aquifer pumping was utilized to

determine the Net Recharge (in/yr) and the River Cell Discharge (in/yr). These two parameters were taken from the existing conditions simulation (the 2010 scenario, which is the same as unmined conditions for these alternatives) and only for the model cells where the Applicants' Preferred Alternatives mine sites are located. The Net Recharge value was part of the input developed for the region by the SWFWMD. This represents the amount of rainfall reaching the SAS. In the active mines, this water is subject to being captured and used onsite. The River Cell Discharge is the amount of water that the SWFWMD model estimates to seep out of the groundwater domain. This drainage volume typically becomes part of the baseflow that maintains the long-duration low flows during the year. Preliminary groundwater modeling of future conditions indicated that the mines' River Cell Discharge did not change appreciably over the study period, so a constant existing conditions value was used for future conditions in estimating potential Excess P.

The mine plans submitted in the applications for the four Applicants' Preferred mines were used to determine how much land was captured. The relative proportion of active mining and CSAs, along with corresponding changes in ET rates, was used to calculate the Excess P for the active and unmined land for each year of the plan. An ET rate of 50 in/yr was used for CSA areas and 20 in/yr for actively mines areas. The Excess P on the mine would then be retained (for onsite reuse) or discharged through an NPDES outfall depending on the available storage in the active mine. Table 5 provides a summary of the range of Excess P values estimated for the Applicants' Preferred Alternatives assuming 50 percent is captured and used onsite. The Excess P values of the water not retained is the surface water delivery potential from each mine for 2020, 2030, 2040, 2050, and 2060 (see Table 6). This alternative computation method provided results within 1 cfs of the runoff coefficient estimates for the peak year reductions for average annual results. Therefore, these estimates provide further validation that the runoff coefficients would provide results of sufficient accuracy for the regional surface water flow estimates.

TABLE 5

Estimated Range of Excess Precipitation of the Applicants' Preferred Alternatives

Hydrologic Component	South Pasture Mine Extension			Ona			Desoto			Wingate East		
	Avg. (in/yr)	Min. (in/yr)	Max. (in/yr)	Avg. (in/yr)	Min (in/yr).	Max. (in/yr)	Avg. (in/yr)	Min. (in/yr)	Max. (in/yr)	Avg. (in/yr)	Min. (in/yr)	Max. (in/yr)
Precipitation	50	--	--	50	--	--	50	--	--	53	--	--
Mined Avg. ET	35.4	28.3	40.2	36.0	32.5	39.6	33.3	29.8	38.1	35.9	33.3	38.7
Groundwater Model River Flux	-0.69	--	--	-2.7	--	--	-3.6	--	--	-0.01	--	--
Unmined Excess Precipitation	6.7	--	--	8.9	--	--	9.7	--	--	14.3	--	--
Mine Excess Precipitation	5.4	3.5	6.7	7.0	5.4	8.8	7.0	5.7	9.5	10.6	9.1	13.6

ET and Excess P varied primarily as a result of the amount of land being mined or utilized by mining at any given year during the life of the mine. “—” means that this value did not vary over the mine life in the evaluation.

TABLE 6

Estimated Excess Precipitation Discharged from Each Applicant Preferred Alternative in the Future with 50 Percent Captured Onsite

Year	South Pasture Mine Extension (in/yr)	Ona (in/yr)	Desoto (in/yr)	Wingate East (in/yr)
2020	6.4	8.8	9.7	12.8
2030	3.6	7.2	6.5	10.0
2040	6.3	5.8	7.4	10.1
2050	6.7	6.2	9.7	10.4
2060	6.7	8.6	9.7	14.3

2.6 Key Assumptions Related to Mining

Several key assumptions were applied during the surface water evaluations. One key assumption was that the current practice of using isolation berms and ditches to retain water and to hydrate surrounding surficial groundwater (i.e., ditch and berm system) will continue at the Applicants' Preferred Alternatives. This assumption is based on the Applicants' plans as presented to the USACE. Control of runoff from mine areas is required under industrial wastewater operations permits issued by the FDEP, and the ditch and berm systems are the infrastructure features used to ensure stormwater capture and to control offsite runoff through outfall structures permitted under the NPDES.

Large areas that are to be mined (mine blocks) are surrounded by ditches and berms before active mining operations and the ditches support surface water management for the active mine areas until those lands are reclaimed and subsequently released from the regulated areas. Each mine plan shows how the active mining would proceed across the mine in mine blocks, and what blocks would be mined during discrete periods of time.

The sequencing of ditch and berm installations around mine blocks, and subsequent reclamation and release schedules, define the timing and duration when stormwater from a particular mine block is re-routed through the mine's internal water system for onsite use or discharge through an NPDES outfall. The key point is that the acreage included in a mine's "capture area" varies over time, with the theoretical capture area curve following a somewhat parabolic shape over the course of a given mine's life cycle. In short, the amount of a mine's total footprint that is removed from contribution to downstream water deliveries is always less than the total footprint, and the relative influence on downstream water deliveries is variable rather than static. Understanding the effects of a given mine on downstream water deliveries thus requires assessment of this dynamic relationship over the full life cycle of the mine.

A second key assumption was that current Florida regulations on phosphate mining and mine reclamation will continue in the future essentially as they currently exist. There are strict schedule limits that require reclamation "as you go." During the life cycle of the mines, portions of the active mine blocks that are finished would be reclaimed and released within a few years. Release of these reclaimed areas cannot occur until they are shown to be reclaimed according to the mine reclamation plan. All four of the Applicants' Preferred Alternatives would use the overburden and sands produced by the beneficiation process to fill mine cuts during reclamation. Clays would be deposited into CSAs. Reclamation of CSAs once they are full requires a longer timeline because of the need for material settling and consolidation to levels allowing grading and re-vegetation. As a result of the sequencing of mine blocks over the course of a given mine's life cycle, and the complex relationships between reclamation schedules and periods, the amount of the mine's footprint which continues to contribute surface water to downstream water bodies varies over time. The variation in "capture area" during the life of the mines is addressed in greater detail in Section 4 of this TM.

For the runoff evaluations for the four Applicants' Preferred Alternatives, it was further assumed that 50 to 100 percent of the stormwater on the actively mined areas was captured and incorporated into the mine recirculation system's waters. In actual operations, there are times when the recirculation system's capacity to store water is exceeded, resulting in offsite discharges to surface waters through the outfalls permitted under the NPDES elements of the applicable industrial wastewater permits issued to mines by the FDEP. The Applicants provided computations indicating that about 35 percent of the potential runoff is captured, on average, at a mine using the typical dragline method⁵. For Wingate East, where a hydraulic dredge is used for most of its mining, there is less available onsite water storage so there is little capture of stormwater. To be conservatively high in the reduction of offsite runoff from an active mine area, a runoff capture of 50 percent was assumed to be closer to a normal surface water reduction. To be even more conservative in times of drought, it was further assumed that all of runoff would be captured at times (100 percent capture). For this case, the capture area analyses applied in the AEIS ignore the fact that at times some of the water captured in the active mine areas is still delivered downstream, at least through seepage from the ditch and berm system. This 100 percent capture was considered a method to conservatively estimate the highest (i.e., bounding) worst-case impact of the Applicants' Preferred mines on downstream water contributions. When discussing the results, a range of potential effects are presented, the 50 percent and 100 percent cases, which are both conservative for normal and droughty conditions, respectively.

The No Action Alternative impact on surface water is the expected runoff in the future with no additional mining in wetlands or streams, but with existing mines being finished and reclaimed. However, how much additional mining that would actually occur is uncertain if the Applicants' Preferred Alternatives were not executed according to the plans submitted in the applications. To quantify the No Action Alternative future flows, no new mining in the Applicants' Preferred Alternatives or offsite alternatives was assumed. This would provide the maximum estimated differences between flow rates from the No Action (without mining) and alternatives with mining. When this TM refers to results without mining, this is the No Action Alternative. In practice, if future mining were to occur on uplands, then the degree of the impacts to surface water would be between the No Action Alternative without mining and the specific alternative evaluated.

Flow computations were performed using spreadsheets, and computations were not rounded until the final tables were produced. Therefore, there may be some small nuances related to rounding the percentages and flows listed in the tables. Additional assumptions related to how to predict the surface water delivery from the mined lands are discussed further in the following subsections.

2.6.1 Effect of Soil Changes to Runoff Coefficients at Mines after Mining is Completed

The runoff coefficient values are defined as a function of soils and land use. The surface water delivery can be described as the direct runoff during and immediately after a rainfall event plus the rainfall that is infiltrated and seeps out to the streams later. Different authors use varying terms to describe the components of the water balance in the near-surface environment. For natural systems on sloped land, there is typically a significant volume of rainfall that infiltrates but re-surfaces at lower elevations, delayed but relatively soon after a storm (from hours to days depending on the slope and geology). As noted above, this component is sometimes called interflow. While not necessarily computed as direct runoff, this delayed flow is part of the record of surface water delivery as monitored at downstream USGS gages. Low flow conditions are often called baseflow, but Lewelling (1997) tended to use the term baseflow to represent only the groundwater derived from lower aquifers. The delayed seepage of rainfall stored in the SAS into streams is also called groundwater discharge (Lewelling, 1997) or groundwater outflow (BCI, 2010b [MIKE SHE simulation]). Regardless of the nomenclature, the runoff coefficients represent a sum of the total runoff over time, including both the direct and rapid runoff and the delayed groundwater component. By utilizing observed gage runoff data to calibrate and adjust the coefficients, they inherently include all components of the surface water delivery from a watershed.

The phosphatic mineral mined (i.e., a combination of rock, sand, and clay that is typically referred to as the *matrix*) is about 40 to 70 feet deep in the Applicants' Preferred mine sites. The soils that overlay the matrix are

⁵ Garlanger, 2011, submitted as comments on the DAEIS. These data were also confirmed in the Water Use Permit applications.

called the overburden, which consists primarily of sandy soil that becomes more clayey and phosphatic with depth (Duerr and Enos, 1991; Lewelling, 1997). Generally, the matrix is near the bottom of the surficial aquifer, which ranges in thickness from 25 to 100 feet in Hardee and DeSoto Counties (Duerr and Enos, 1991). The intermediate Florida aquifer system (FAS) consists of three primary layers, with the top and bottom consisting of clayey layers that restrict groundwater flow between the aquifers (i.e., surficial, intermediate, and Floridan) (Duerr and Enos, 1991). These restrictive layers affect the movement of groundwater that is infiltrated into deeper zones (also called deep recharge). The net recharge under the Applicants' Preferred Alternatives is expected to have similar deep recharge for both pre- and post-mining because these deeper restrictive layers of soil would not be altered.

Consequently, the SAS is the region of most interest concerning soil impacts because it would be dramatically altered during the mining process. The surface water runoff would be affected by the nature of the top layer of soil (A horizon) and the position of the groundwater table during the year. The amount of rainfall that can be infiltrated would be reduced during high water table conditions and stored groundwater could discharge more readily when the water table is closer to the surface. The NRCS assigns mixed hydrologic soil group designations (e.g., A/D) to represent the runoff potential of poorly drained conditions (including high water table). This high water table condition, which varies during the year, is primarily why the runoff coefficients were divided into dry and wet season components. The runoff coefficient method used the different seasonal values to account for temporal differences. To provide an illustrative example, the soils at the Desoto Mine site were used to estimate the effect of mining on the predicted surface water runoff by the runoff coefficient method.

The Desoto Mine site encompasses about 18,500 acres (based on the GIS shape file provided by the Applicant), of which 18,282 acres would be actively mined during the life of the mine (according to the mine plan). Using the hydrologic soil group and land use for the existing Desoto Mine footprint, the predicted pre-mining runoff coefficients from this area are 0.27, 0.36, and 0.30 for the dry, wet, and annual values, respectively (as derived from the analysis in Section 5). The ratio between wet and dry season values is 1.35, or 35 percent higher runoff potential during the wet season. However, the annual value is averaged based on the typical amount of rainfall that falls in each season (1/3 during dry season and 2/3 during wet season).

The way that the phosphate industry manages soils and reclaims land has changed over the years. When an area is mined (a mine block), the topsoil and other soils that may be useful in reclamation, like muck, are stripped and used elsewhere on the mine, or stored. The next layers of soil are collectively called the overburden, which is placed in an adjacent cut or stored for later use. The bulk of the fill in the open cuts is overburden, which becomes more homogenous through the handling process. The matrix is separated at the beneficiation plant, clayey material is sent to CSAs for settling, and the sand tailings are used to help restore the topography on top of the overburden and into gaps formed by irregularities in the surface. In some cases, overburden is mixed in the sand tailings to help provide workability and water storage capacity for future plantings. CF Industries has recently been using a sand/clay mixture for its backfilling and reclamation but would not use this method at the South Pasture Mine Extension. The conventional clay disposal techniques (CSAs) are used now to reduce the footprint of the CSAs and to increase the sandy soil tailings. Additionally, improved methods of operating the CSAs allow them to be reclaimed more quickly than in previous years. However, as the CSAs settle, there are areas that remain very wet or even open water. While the Applicants do not receive mitigation credit for these wet areas (approximately 20 percent of the CSAs), these areas still affect the runoff potential from the post-reclamation sites. To summarize, the post-reclamation mines would consist of sandy soils and low-permeability CSAs that have a substantial fraction of wet area. Topsoil would be utilized to improve the surface for plantings, and mucky soils would be spread on top of areas designated to be reclaimed as wetlands.

The post-reclamation plans are specified in the Applicants' conceptual mine plans, which become part of their permit. These plans would be regularly updated during the life of the mine. For the Desoto Mine, the conceptual mine plan was used to identify the areas to be mined and CSAs, as shown in Table 7. While the footprints may vary somewhat among the Applicants' Preferred Alternatives because of differing quantities of clay, Desoto represents a new mine without any sharing of existing CSAs, which is why it was chosen for this example (i.e., a stand-alone mine). The counties typically require that the mines be restored to the general land use that existed

prior to mining (agricultural) to the extent practicable. The runoff potential of the post-reclamation mined landscape was evaluated by assuming that the average runoff potential of the A soils pre-mining represented a mixed land use similar to the sand tailings fill areas. The CSAs are normally used as improved pasture (D soils for clayey material) and about 20 percent of them are wet or open water. The appropriate runoff coefficients are shown in Table 3, and they were applied to the areas (also listed) to develop new runoff coefficients for the post-mine. As shown in Table 7, the difference between the predicted pre- and post-mine runoff coefficient is negligible.

Florida rules require that the restoration of the mines meet their reclamation plan objectives. The landscape is topographically graded to contours similar to pre-mining, and the soils must be utilized in a manner to support their use (uplands, forested wetlands, emergent wetlands, etc.). Once the reclaimed mine is released, the outfalls are removed and there is no practical way to monitor flows onsite. Therefore, it is presumed based on mine application information that the long-term runoff is similar to pre-mined conditions over an area-weighted basis. Also, a runoff coefficient of 0.3 (from Table 7) times the adjustment factor of 0.7, which was used in the long-term runoff equation, is 0.21 (Section 2.3) and this is very similar to the percent of rainfall monitored as surface water delivery at the Horse Creek USGS flow gage near Arcadia (22.4 percent; Schreuder, 2006).

TABLE 7

Example Change in Surface Water Runoff from Desoto Mine using Runoff Coefficients

Areas to be Used at Desoto Mine (per Application)	(ac)		
Total Area	18,465	= Total Desoto footprint (area in GIS)	
Area to be Mined in total	18,282	from Desoto Mine plan (mine blocks)	
Area not to be Mined (wetlands/urban)	183	Difference from mine plan and GIS footprint	
Total Area to be reclaimed, but not CSAs	13,990	= Non-CSA post-reclamation, A Soils	
Areas of CSAs from Desoto Mine Plan (23.2%)	4,292	= CSAs, D Soils	
Runoff Coefficients to use Post-Mining:	Dry	Wet	Assumptions
Mined Area; Avg. of Pre-Mined A Soils Cd	0.25	0.34	Conservatively low runoff for post-mining reclaimed soils
Non-Mined Area; Avg. of Pre-Mined D Soils Cd	0.65	0.75	Assumed mostly roads, drainage, and ditch system
Open-Water/Freshwater Marsh in CSAs, Avg. Cd	0.70	0.80	About 20% of post-mined CSA becomes either swamp or open water
Reclaimed CSAs, D Soils Pasture Cd	0.22	0.30	Post-reclamation CSA typical land use
Results	Dry	Wet	Annual
Post-Mining Average Cd (area weighted)	0.267	0.358	0.297
Pre-Mining Average Cd	0.267	0.361	0.299

While detailed hydrologic modeling of the water balance is not required for the 404 permit application, CF Industries provided an analysis for the South Pasture Mine Extension that they submitted to the FDEP for the ERP application. The MIKE SHE model was utilized to predict the detailed water balance at South Pasture and South Pasture Mine Extension before and after mining (also known as pre- and post-mining) at a small enough grid size (250 x 250 meters) to capture the differences in the landscape (soils, topography, and land use). Table 8 provides a summary of their water balance results expressed as an average of the annual averages over a 15-year simulation period (i.e., using rainfall from 1995 to 2010; BCI, 2010b). This table shows that more water is expected to be retained in the soil or in surface storage and that, in turn, provides more water for ET loss. Surface water delivery as estimated from this analysis is actually somewhat lower, but there is more water captured in the groundwater because of improved wetland capture by the elimination of farm ditches, which is a positive

restoration goal. Even with the extra water in the ground, the deep recharge to the intermediate FAS remains similar (about 9 percent more recharge). The net flows across the model boundary in both surface and groundwater are close to each other (pre-mining 13.2 in/yr versus post-mining 12.2 in/yr). The pre-mining total of the simulated overland flow, surface boundary outflow, and baseflow is 10.7 in/yr, similar to the monitored flow at the Horse Creek USGS gage near Arcadia (10.7 in/yr; Schreuder, 2006).

TABLE 8

Simulated Pre- and Post-Mining Water Balance at the South Pasture Mine Extension

Water Balance	Pre-Mining Avg. (in/yr)	Post-Mining Avg. (in/yr)	Difference (Post-Pre)
Rainfall	50.65	50.65	0.00
ET	37.85	39.16	1.31
Overland Flow	10.17	9.09	-1.08
Baseflow	0.26	-0.03	-0.29
Surface Boundary Outflow	0.25	-0.09	-0.33
Groundwater Boundary Outflow	2.49	3.07	0.58
Overland Storage Change	-0.09	-0.15	-0.06
Saturated Zone Storage Change	-0.56	-0.44	0.12
Unsaturated Zone Storage Change	0.29	0.04	-0.26
Error	-0.01	0.01	
Deep Recharge to Intermediate FAS	2.41	2.62	0.21

Source: Tables IMR-11 and IMR-12; BCI, 2010b

FAS is the Floridan aquifer system

Simulation period 1995 to 2010

The South Pasture mine would use the clay/sand mixture to reclaim land, while the South Pasture Mine Extension would use the conventional sand tailing method to reclaim land. Lewelling and Wylie (1993) evaluated the hydrology and water quality from unmined and reclaimed lands that utilized these two different reclamation practices. The hydrologic response (and water quality) from the conventional sand tailings reclaimed mines were found to be similar to those of the unmined lands. The land reclaimed utilizing a sand/clay mix had somewhat reduced surface runoff attributed to surface storage on a recently reclaimed CSA but more rapid responses from clayey areas that are well drained; and a more gradual response to water table recharge in the heavier reclaimed soils (Lewelling and Wylie, 1993).

In summary, these results indicate that the modified landscape does not increase runoff on average because of the CSAs and the deeper recharge over the mine footprint remains similar. While one approach indicates that the long-term average delivery of surface water from reclaimed mines should be similar to pre-mining conditions (runoff coefficients), the computer simulations indicate that the immediate surface water delivery may be somewhat lower (about 10 percent on a long-term average). The net flow across the model boundary as estimated in the model is similar in terms of in/yr between pre- and post-mining conditions at the South Pasture Mine Extension (less than a 1-in/yr difference, about a 10 percent change). Retaining more water onsite is typically considered a positive outcome for the reclamation of farmed areas. Therefore, the net water balances between the pre- and post-mining conditions for the Applicants' Preferred Alternatives are considered to be similar and the differences small. The runoff coefficient method was considered adequate to apply to the reclaimed mine lands based on the available literature.

2.6.2 Post-Reclamation Land Use

Often the local zoning requirements or county-level plans for future land uses influence the post-mining land use (e.g., agricultural, water features, etc.); however, on a large-scale average, most of these lands would be used for agricultural purposes after mining.

For the purposes of analysis, after land is mined, reclaimed, and released, the land use type changes from mining to a combination of pasture, row crop, forested wetland, and non-forested wetland at a predetermined rate based on past reclamation practices. For this evaluation, it is assumed that 46 percent of the reclaimed mined land is reclaimed to pasture, 42 percent to row crop, 5 percent to forested wetlands, and 7 percent to non-forested wetlands. This change was applied to both the existing mined land and the Applicants' Preferred Alternative.

3.0 Land Use Projections

The AEIS evaluations were designed to compare the predicted surface water delivery with each of the Applicants' Preferred mines and offsite alternatives in operation to the current flows and to the No Action Alternative (No Action was defined in Section 2 as to assume no mining on the alternative sites). The periods of new mine operations would extend through the life of the alternative or until approximately 2060, the 50-year time period of the AEIS. Therefore, to have reasonable No Action Alternative results to compare against, a means of predicting the effects of future land use changes (other than for phosphate mining) on subwatershed discharges to downstream reaches was required. Such changes in land use over time would be anticipated to modify the existing levels of discharge from a given watershed, with the presumption being that increased urbanization over time would cause a gradual increase in net runoff rates. To account for this change in the existing discharges from the affected subwatersheds, future land use projections through 2060 were needed. Agency projections of land uses this far into the future was not available. Therefore, projections of land use were developed to support this AEIS analysis.

Projections of future land use changes were developed primarily based on the rate of change observed in the SWFWMD FLUCCS data since 1990 for both the No Action Alternative and with the Applicants' Preferred mines and the offsite alternatives. Land use projections through 2060 were developed in 10-year increments (2020, 2030, 2040, 2050, and 2060). Land use areas for 1990, 1999, and 2009 reflect actual land use from the corresponding SWFWMD GIS database, and land use areas for 2020, 2030, 2040, 2050 and 2060 are projections. The predictions of mining land use are based on existing, Applicants' Preferred, and most likely development of offsite alternatives, as currently known. For the No Action Alternative, the mine plans of the existing mines were assessed and used to alter their future land use. After the mine is reclaimed and released according to the plan, the land use would presumably change to pasture, row crop, forested wetlands, and non-forested wetlands, as described in Section 2.6.3 above. As for the other land use categories, they represent extrapolations of land use change based on previous trends.

In general, land use changes expected in the three subwatersheds where mining would occur through 2060 include increases in urban land uses and decreases in agricultural land uses. Relatively little change was predicted in land use associated with wetlands based on the historical trends from 1990 through 2009. The projected land use changes were adjusted slightly to ensure that the sum of acreages within the area of interest remained consistent. These projections were used to assess temporal changes in runoff characteristics within these subwatersheds' No Action Alternative and under the influence of the Applicants' Preferred Alternatives and offsite alternatives (with-mining). Figures 15 and 16 present land use projections for the Horse Creek subwatershed for the No Action Alternative and for conditions with the Applicants' Preferred Alternatives and Pioneer Tract Alternative, respectively.

The Horse Creek subwatershed would be the most impacted by the Applicants' Preferred and offsite alternative mines in terms of percent of land mined. In general, the main differences between the No Action Alternative (no mining) scenario and the with-mining scenarios are a shift in the mining land use (primarily pasture lands and mining) in the future. Figures 17 and 18 present land use projections for the Peace River at Arcadia subwatershed

for the No Action Alternative and for conditions with the Applicants' Preferred and Pioneer Tract Alternatives, respectively.

The Peace River at Arcadia subwatershed would experience less mining in terms of area with the Applicants' Preferred and offsite alternatives than it has in the past and with current mines. In terms of percent of the area being mined, the mining land use is relatively small when compared to other predominant land uses. Figures 19 and 20 present land use projections for the upper Myakka River subwatershed for the No Action Alternative and for conditions with the Wingate East and Pine Level/Keys Tract Alternatives, respectively.

FIGURE 15

Land Use Projections for Horse Creek Subwatershed for No Action Alternative through 2060

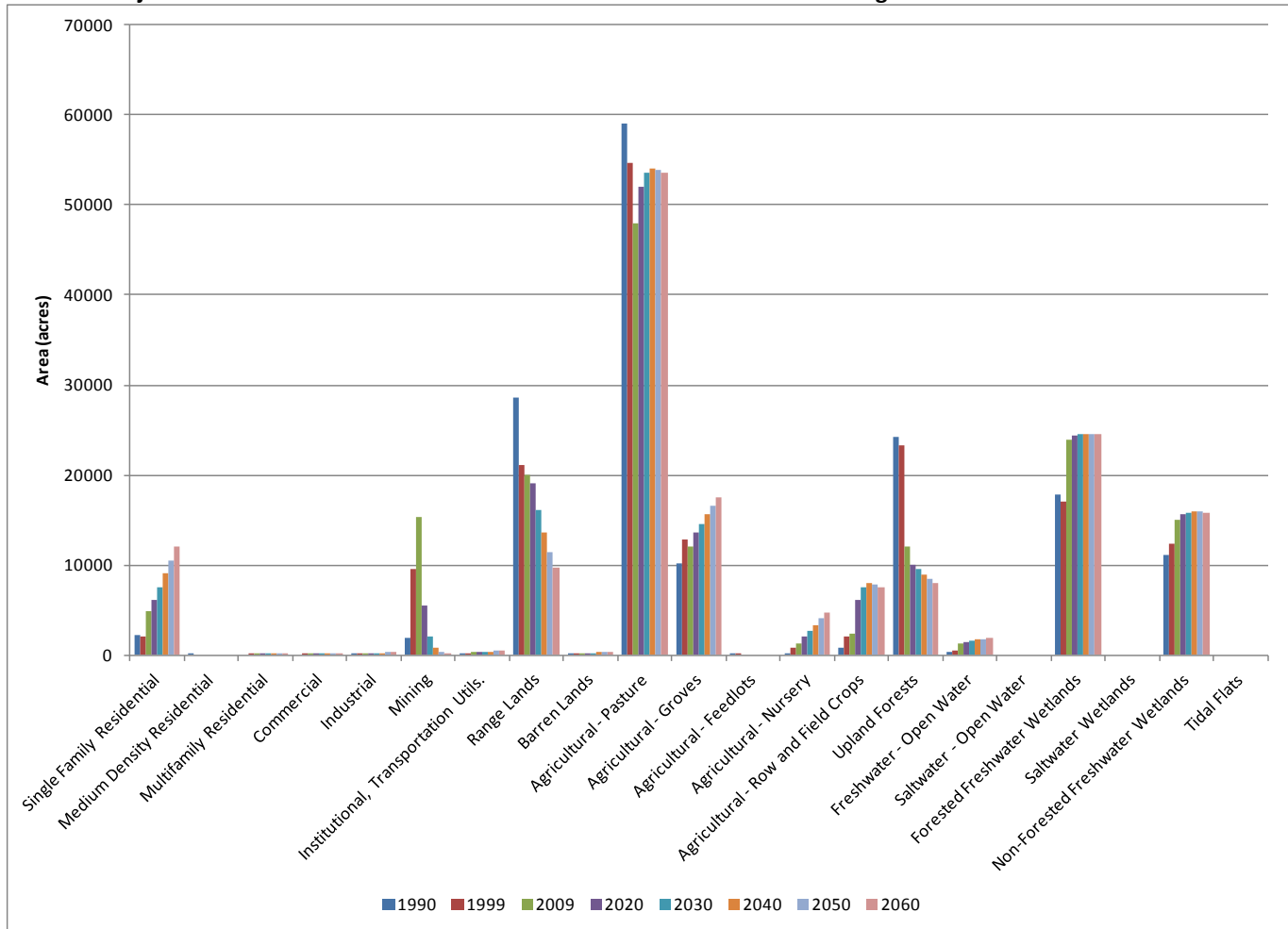


FIGURE 16

Land Use Projections With-Mining for Horse Creek Subwatershed through 2060 (includes Pioneer offsite alternative)

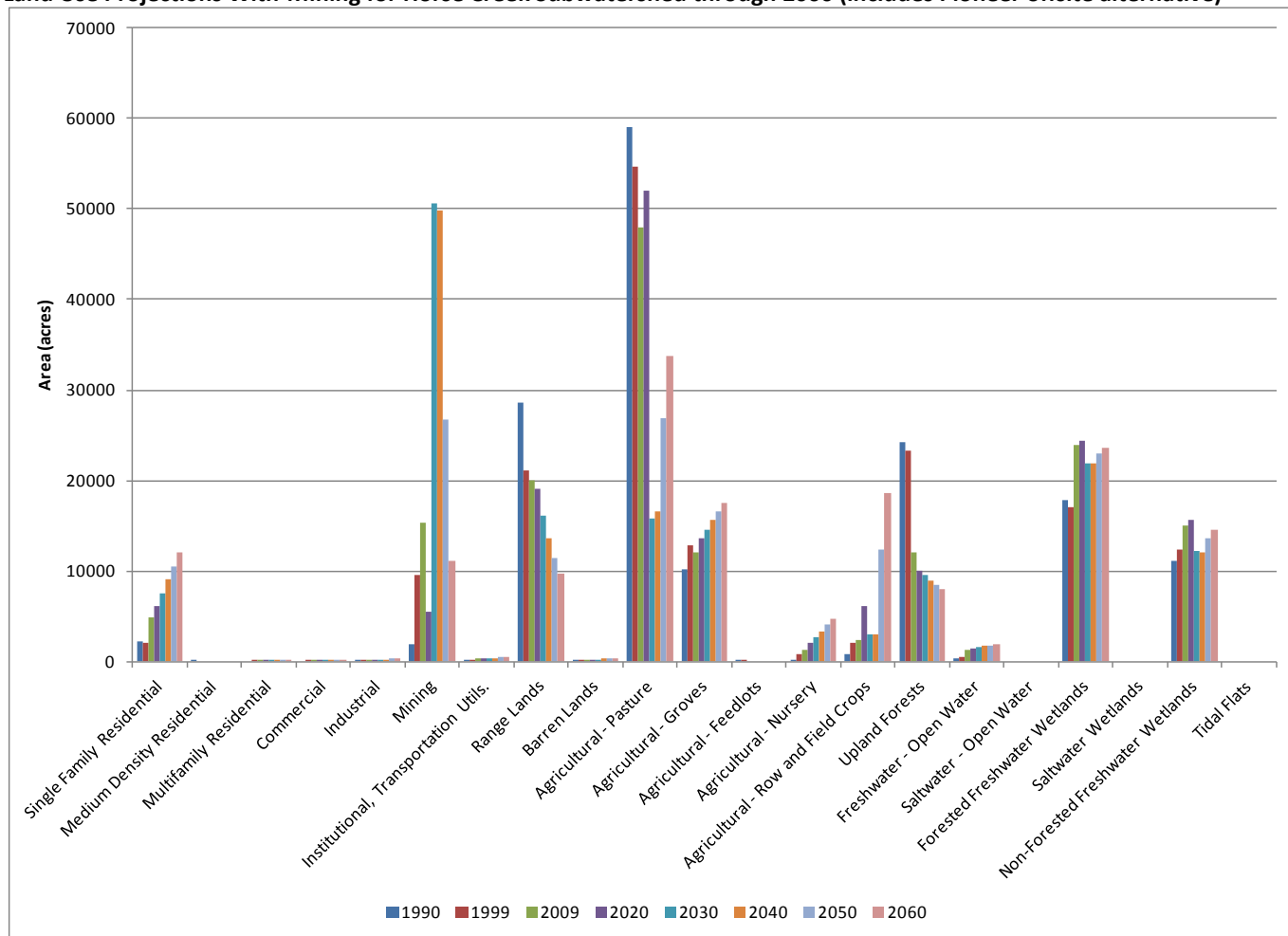


FIGURE 17

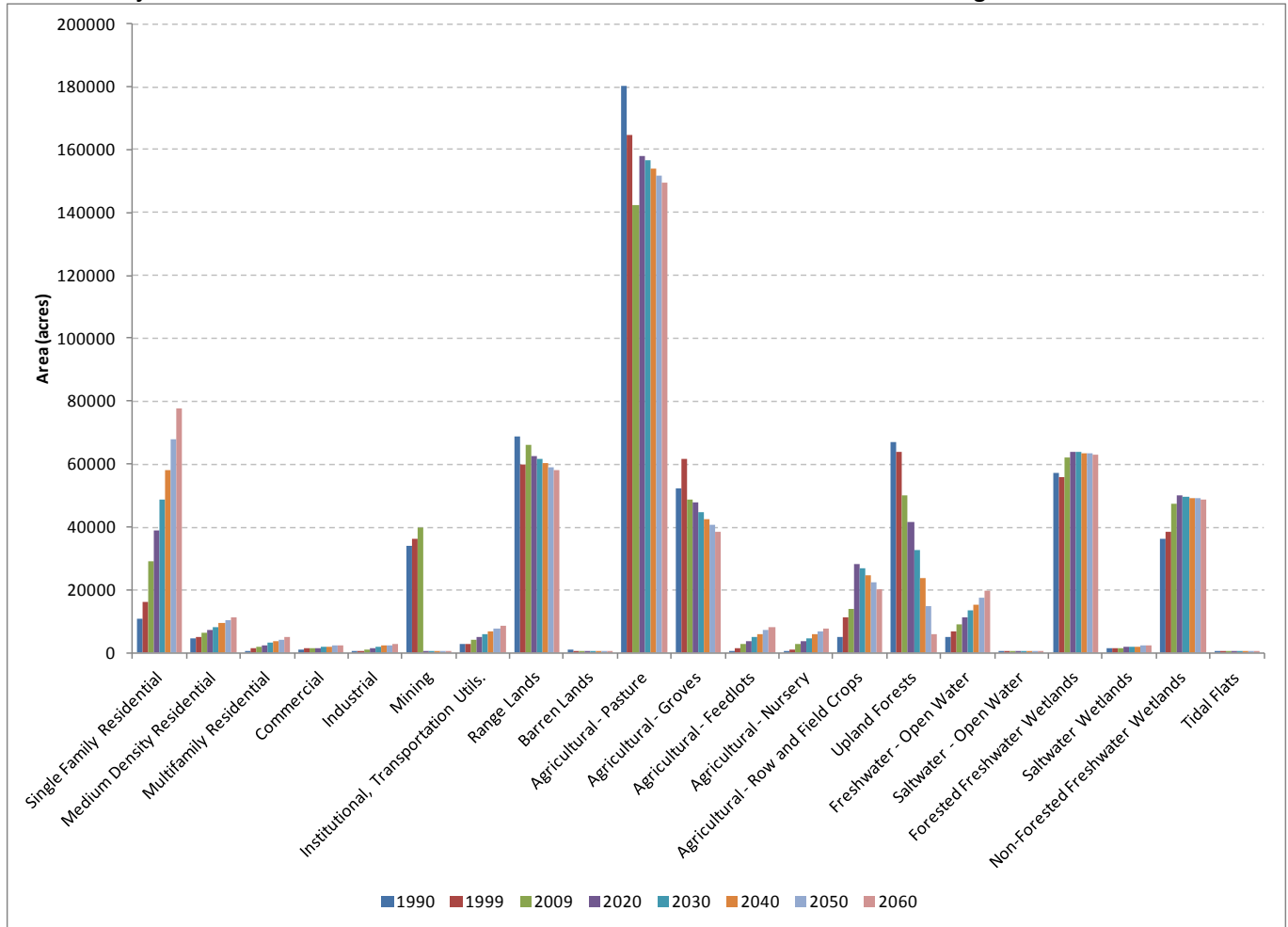
Land Use Projections for Peace River at Arcadia Subwatershed for No Action Conditions through 2060

FIGURE 18

Land Use Projections With-Mining for Peace River at Arcadia Subwatershed through 2060 (includes Pioneer offsite alternative)

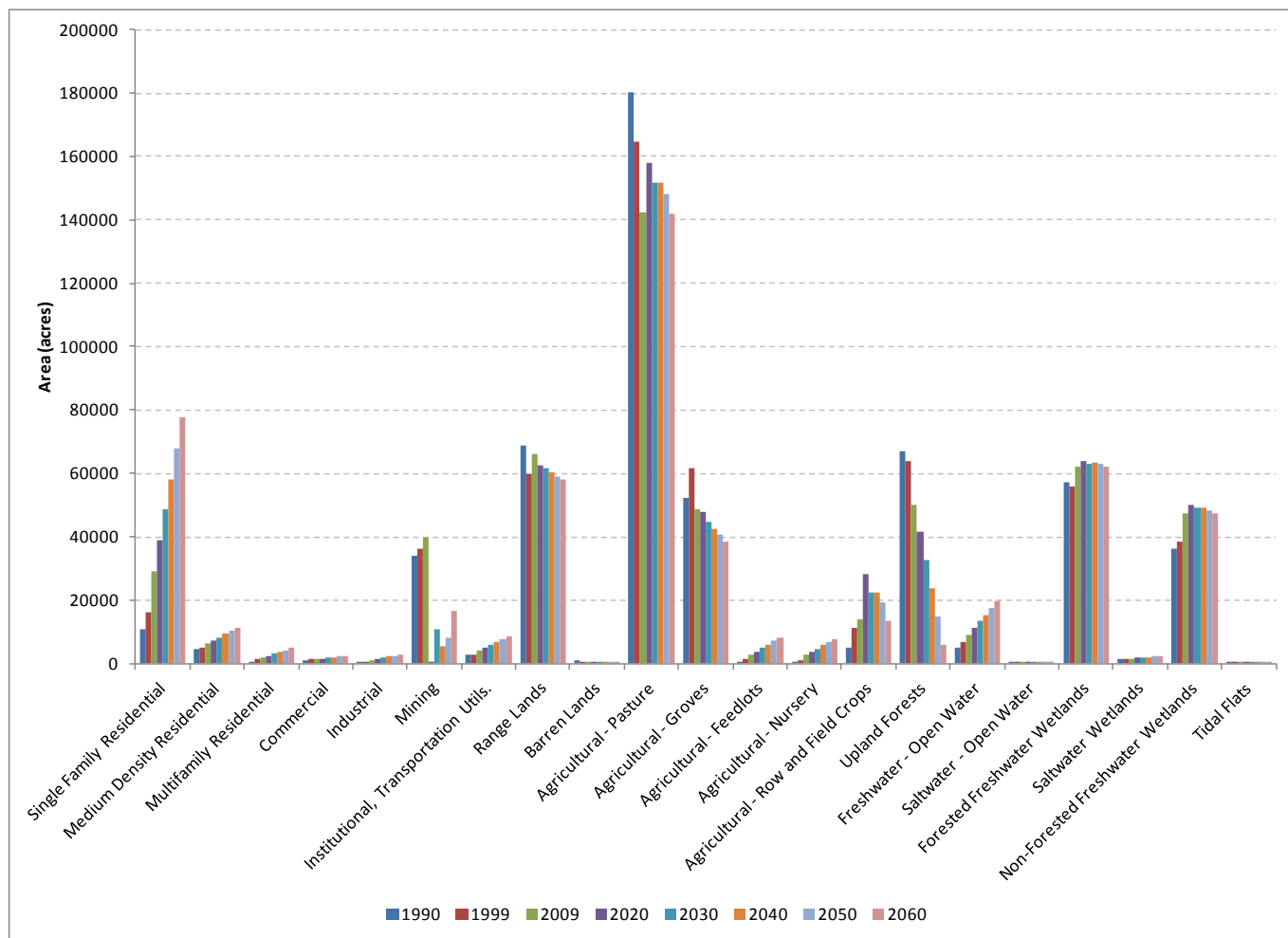


FIGURE 19

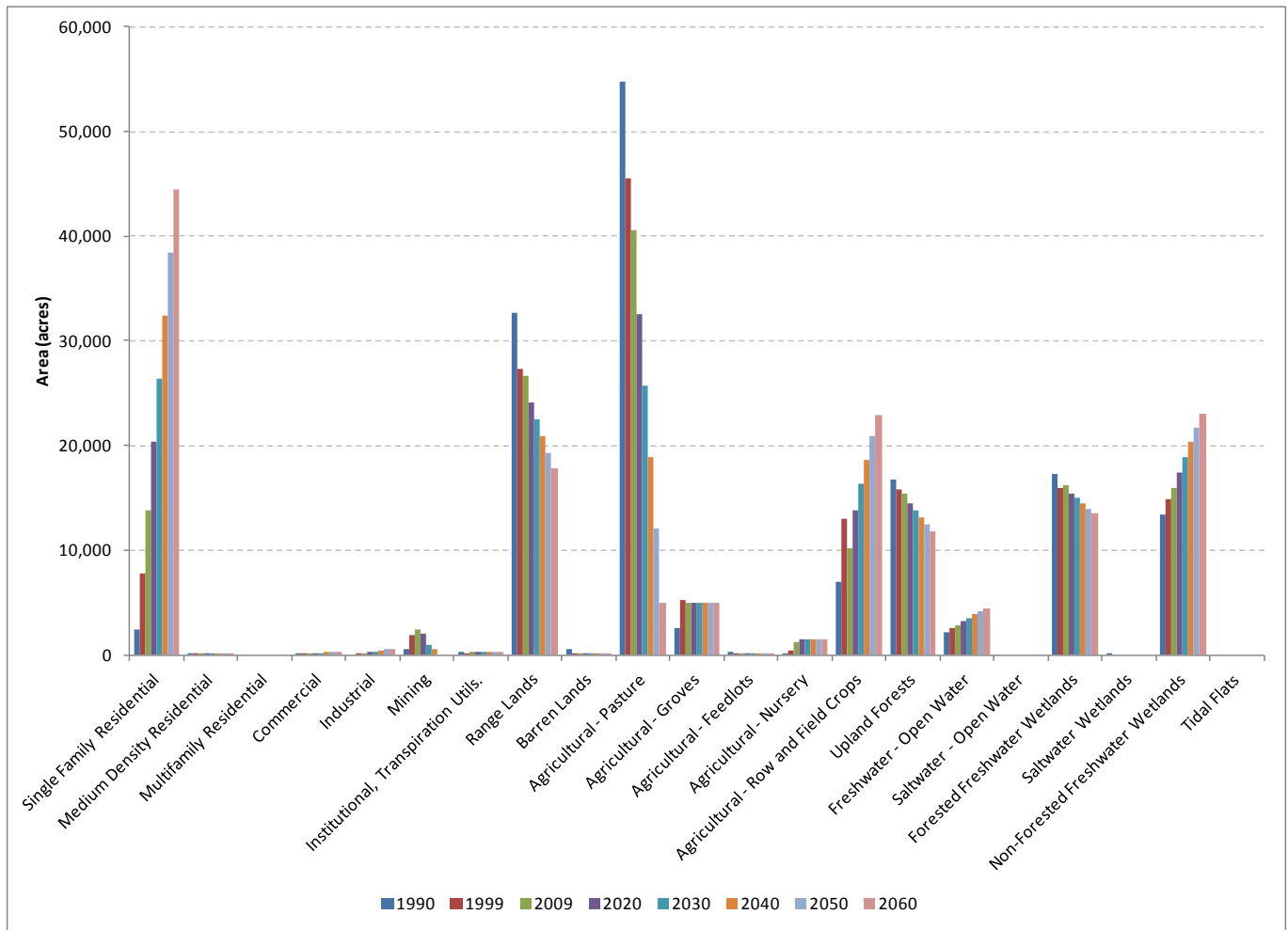
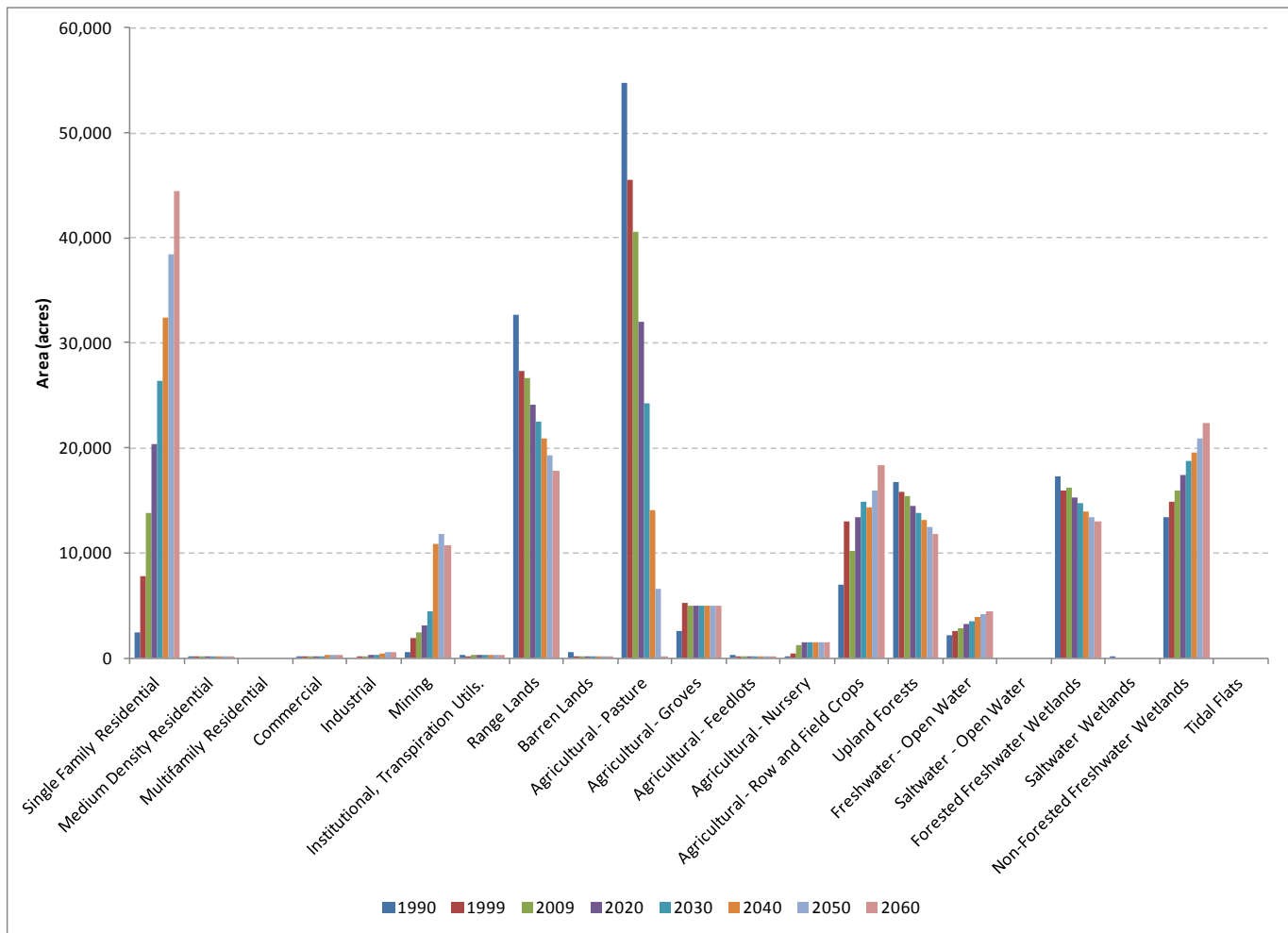
Land Use Projections for Upper Myakka River Subwatershed for No Action Conditions through 2060

FIGURE 20

Land Use Projections With-Mining for Upper Myakka River Subwatershed through 2060 (includes Pine Level/Keys offsite alternative)



In terms of percent of the area being mined either past or present, the mining land use in the upper Myakka River subwatershed is relatively small when compared to other predominant land uses. These land uses were not plotted here, as there is negligible apparent change in the charts. Urban land uses, in particular single family residential, are projected to grow significantly in both the No Action Alternative (without mining) scenario and the with-mining scenario in the upper Myakka River subwatershed. In general, the main differences between the No Action Alternative and the with-mining scenario are a minor shift in the mining and pasture lands land uses.

Runoff coefficients for land uses were assigned using the Janicki-defined values shown in Table 3 for the No Action Alternative. For the alternatives with mines for the 100 percent capture case, the alternative's area was just removed from the computation. The runoff from the alternatives for the 50 percent capture case were addressed by assuming that 50 percent of the area captured had no runoff.

4.0 Capture Area Projections within Applicants' Preferred and Offsite Alternatives

The mining operation would be initiated by construction of the ditch and berm system to protect offsite properties from the dewatering required during mining. The rainfall falling inside the perimeter would remain within the mine stormwater management area—or capture area until the land is released from reclamation

requirements and not with the beneficiation plant⁶. The capture area for a given mine represents the portion of the mine which retains its stormwater runoff within the recirculation system, and the downstream surface water contribution is controlled for the period of time required to prepare the land for mining, mine the land, fill the mine pits with overburden and sand tailings, reclaim the land, and then monitor water quality until there is adequate documentation allowing the mine block to be released from within the industrial operations' boundaries (or, the mined area is simply called *released*). As discussed previously, a range of captured stormwater volume within this area was assumed (50 or 100 percent) to represent conservatively high surface water delivery reductions from the active mines for average and dry conditions.

The capture curves for each of the Applicants' Preferred and offsite alternative mines were developed as an independent analysis of possible mine acres impacted over the life of the mine. The following assumptions and conditions based on typical current mining practices were applied in determining the capture areas for each of the Applicants' Preferred Alternatives as a function of time during the individual mine's life cycle:

- Land clearing is initiated 1 year prior to mining.
- The ditch and berm system is constructed prior to land clearing.
- Areas to be isolated by the ditch and berm system and how the blocks would be mined were defined in the mine plan, based on current practices and typical dragline production rates (except for Wingate East Mine which uses a hydraulic dredge for about 60 percent of its mined area).
- The active mining operation includes the filling of the mine cuts with overburden and sand tailings.
- The reclamation parcel is re-connected to the watershed about 1 year after completion of reclamation (total of 3 years). This means that the ditch and berm system is removed at this time.
- CSAs require a minimum of 5 years for initial consolidation and 3 years for reclamation, with the overall average release being 10 years from last filling.
- The mine plan and the reclamation plan submitted with the applications were used to determine the years of capture.
- The capture curves developed in this manner included the mined areas and disturbed lands within the mine. Additional information about the development of the capture area curves for each mine is provided in Attachment B of this TM. For each of the four Applicants' Preferred mines, the capture areas developed in this manner are conservative – that is, the area captured in the AEIS exceeded the maximum acres reported to be mined at any one time as presented in the Applicants' mine plan data submitted in the applications. The shapes of the capture curves developed by AEIS assumptions (described above) and the areas reported by the Applicants (from plotting the “disturbed and not yet reclaimed” acres in each of the Applicants' mine plans) were similar. The independent estimate was applied in the AEIS process to encompass potential changes to the schedule that may cause slightly larger area impacts in the future. The variation between the maximum acres captured in any 1 year over the life of the mine – between the AEIS parcels and the mine plan data--is presented below:

⁶ This statement is true for all future mines addressed in the applications. The capture analysis does not depend on where the ore is separated from the matrix. The area occupied by any future beneficiation plants would be relatively small (negligible relative to the whole mine) and stormwater would be managed at those sites under current industrial wastewater practices.

	<u>Maximum Captured Acres at any 1 Year</u>	
	AEIS Analysis	Mine Application Data
Desoto	15,312 ac	10,492 ac
Ona	15,096 ac	11,969 ac
Wingate	2,398 ac	1,653 ac
South Pasture Ext.	6,106 ac	3,933 ac

The capture areas are used to calculate the reduction to the surface water delivery from the active mines in each subwatershed by defining approximate acres and years that the mines would affect watersheds during mining and reclamation activities. The capture curves for each of the Applicants' Preferred mines and the Pine Level/Keys and Pioneer Tracts are described in the following sections.

The capture area analysis for each of the Applicants' Preferred mines was based on mine plan information in the respective permit applications received by the USACE. No permit application and no mine plans exist for any offsite alternatives (Pine Level/Keys Tract, Pioneer Tract, Site A-2, or Site W-2) so conceptual mine plans were generated for offsite alternatives evaluated quantitatively. The conceptual mine plans developed support the capture area analyses for the two offsite alternatives quantified (Pine Level/Keys and Pioneer Tracts) were based on a layout of mine blocks, dragline mine years, and reclamation parcels and schedules generated that were similar to those of the mining plans for the four Applicants' Preferred Alternatives (Desoto, Ona, Wingate East, and South Pasture Mine Extension). The conceptual plans were not based on input from the mine operators or prospecting data for the phosphate ore body within the prospective mine areas. The other two alternatives (Sites A-2 and W-2) were evaluated qualitatively so no conceptual mine plans were developed for these sites.

Table 9 provides a listing of the alternatives and how their area is distributed in the subwatersheds according to the GIS data that is generally available (see Figures 1 and 2 for the maps). However, there are some conditions that must be considered when using the GIS database. For example, the hydrologic boundaries are sometimes uncertain, especially in the flat land commonly found in southwest-central Florida. The GIS maps are precise, but not always accurate. This is the case for the Desoto and Pine Level/Keys Tract where the GIS mapped sizeable portions in subwatersheds that is not believed to be accurate. The Desoto mine boundary crosses into the Coastal subwatershed of Peace River, but on closer field review these portions are really in the Horse Creek subwatershed. Regardless of the mapping, issues like these will be addressed in greater detail during state permitting. Generally, if the mine boundary overlaps an adjacent subwatershed by a few hundred acres or less, it was attributed to mapping imprecision.

TABLE 9

Area of Alternatives in Watersheds and Subwatersheds as Mapped on GIS Coverage

Alternative	Watershed	Subwatershed	Smaller Creeks/Streams in Subwatershed(1)	Acreage
Desoto Mine	Myakka River	Big Slough	North Cocoplum Waterway	355
			Wildcat Slough	1
			Big Slough Canal	19
	Peace River	Coastal Lower Peace (2) Horse Creek	Lower Horse Creek	4,030
			Brandy Branch	893
			Middle Horse Creek	2,826
			Buzzard Roost Branch	8,244
		Peace at Arcadia	McBride Branch	1,919
			Total Acreage	18,287
Ona Mine	Myakka River	Upper Myakka River	Wingate Creek	269
	Peace River	Horse Creek	Horse Creek Headwaters	4,216
			Upper Horse Creek	839
			Brushy Creek-Horse Creek	12,187
			Troublesome Creek	1,771
		Peace at Arcadia	Oak Creek	3,037
			Total Acreage	22,320
Wingate East Mine Extension	Myakka River	Upper Myakka River	Wingate Creek	3,216
			East Fork of the Manatee River	65
	Peace River	Horse Creek	Horse Creek Headwaters	355
			Total Acreage	3,635
South Pasture Mine Extension	Peace River	Horse Creek	Horse Creek Headwaters	20
			Brushy Creek-Horse Creek	5,304
		Payne Creek	Lower Payne Creek	409
		Peace at Arcadia	Troublesome Creek	1,781
			Total Acreage	7,514
Pine Level/Keys Tract	Myakka River	Big Slough	North Cocoplum Waterway	1,588
			Wildcat Slough	10,762
			Mud Lake Slough	3,295
			Big Slough Canal	5,082
		Upper Myakka River	Owen Creek	450
			Tatum Sawgrass Swamp	49
			Lower Horse Creek	66
		Coastal Lower Peace (2) Horse Creek	Buzzard Roost Branch	3,418
			Total Acreage	24,711
Pioneer Tract	Myakka River	Upper Myakka River	Owen Creek	9
	Peace River	Horse Creek	Upper Horse Creek	6,216
			Brushy Creek-Horse Creek	4,263
			Middle Horse Creek	345
			Troublesome Creek	3,075
		Peace at Arcadia	Oak Creek	8,491
			Limestone Creek-Peace River	1,855
			Peace River Branch	1,005
			Total Acreage	25,259
Site A-2	Peace River	Charlie Creek	Buckhorn Creek	64
		Peace at Zolfo Springs	Little Charlie Creek	7,771
			Thompson Branch	354
			Total Acreage	8,189

TABLE 9

Area of Alternatives in Watersheds and Subwatersheds as Mapped on GIS Coverage

Alternative	Watershed	Subwatershed	Smaller Creeks/Streams in Subwatershed(1)	Acreage
Site W-2	Myakka River	Upper Myakka River	Oglegly Creek	8,249
			Maple Creek	360
			Tatum Sawgrass Swamp	1,110
			Total Acreage	9,719

Basin Boundary Source: Hydrologic Unit Maps from NRCS (2013)

- (1) The GIS map for alternative and subwatershed boundaries overlap, but small areas were considered minor or an artifact of GIS coverage precision of mine and watershed boundaries.
- (2) The GIS map from the NRCS has some of Horse Creek subwatershed in the Coastal subwatershed, but this area was assigned to the Horse Creek subwatershed.

4.1 Desoto Mine

The site of the Desoto Mine is mostly within the Horse Creek subwatershed, but a portion is within the Peace River at Arcadia subwatershed. This mine would require the construction of an initial CSA, a beneficiation plant, and initial mine infrastructure corridors. The Desoto Mine anticipated schedule has mining to continue for the first 13 years of the mine life, and reclamation to continue to mine year 23. The Desoto Mine would be anticipated to begin mining in 2021. The capture area graph for the Desoto Mine is presented in Figure 21. As indicated in this figure, mining activities would affect both of these subwatersheds concurrently for much of the duration of the mining activities planned for this mine. This alternative will be reclaimed by 2060, and probably much sooner.

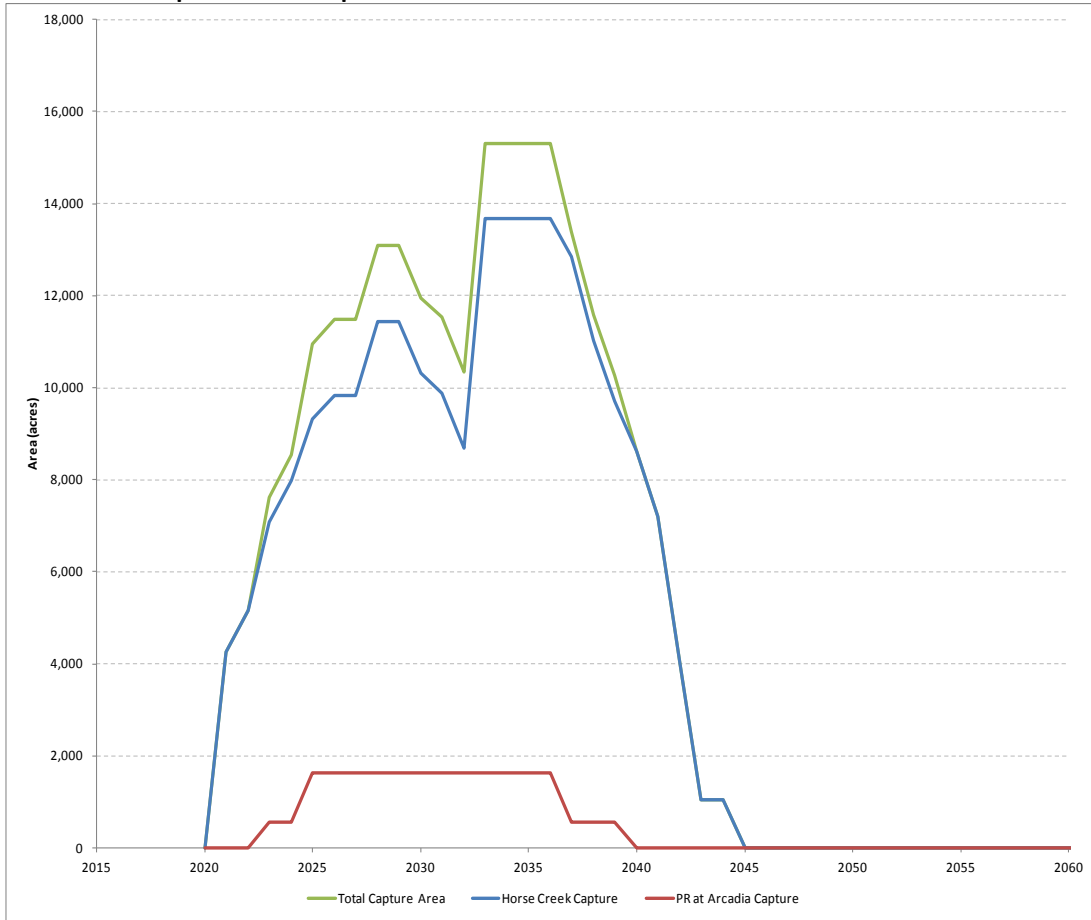
4.2 Ona Mine

The Ona Mine site is mostly within the Horse Creek subwatershed, but includes some small portions within the Peace River at Arcadia subwatershed and the upper Myakka River subwatershed. The Ona Mine would use the CSAs in two existing mines to support the initial stages of mining. This would allow mining to begin without having to construct a CSA on unmined ground. The use of existing CSAs would also allow the use of mine corridors in these two existing mines, reduce the CSA footprint in the alternative, and reduce overall capture time and acres for this mine. The estimated capture area graph for the Horse Creek, Peace River at Arcadia, and upper Myakka River subwatersheds from the Ona Mine is presented in Figure 22. Mining at the Ona site would be anticipated to begin in 2020. The Ona Mine anticipated schedule has mining to continue for the first 29 years of the mine life, and reclamation to continue to mine year 45. This alternative will not be fully reclaimed by 2060, but very close to being finished.

The capture area curve for the Ona site reflects the gradual increase in acreage included in the recirculation system boundary over the roughly 29-year duration of active mining, with a gradual return of lands to contribute to downstream flows as reclamation rates gradually exceed the mining rates and result in a net decrease in the capture area acreages. On the basis of this analysis, the peak years of capture would be predicted to occur toward the end of the period of matrix extraction, after which reclamation and land release would gradually return the full mine footprint to a state of contributing runoff to downstream waters.

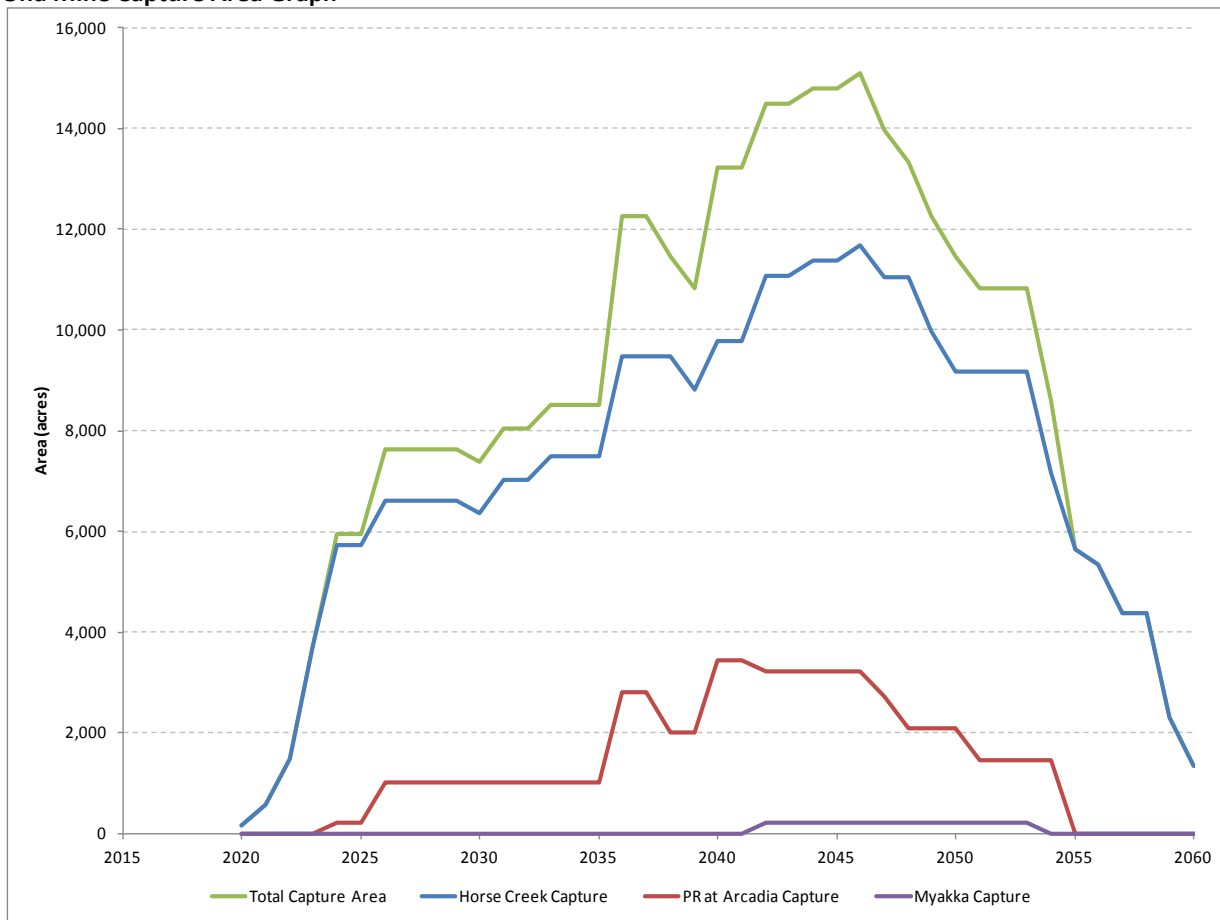
The mining sequence indicates that for approximately the first 5 years of mine operations, the areas tributary to the Peace River at Arcadia and Myakka River subwatersheds would not be impacted by the Ona Mine. The acreages within these two subwatersheds would be relatively small at any time during the life of the mine, and the durations of influence much shorter than the likely influence on the Horse Creek subwatershed. The area of this alternative in the Upper Myakka River subwatershed was not analyzed in detail due to its small size (about 269 acres).

FIGURE 21

Desoto Mine Capture Area Graph

Note: Derived from the sequence of mining as provided by Mosaic in the Section 404 permit application.

FIGURE 22
Ona Mine Capture Area Graph



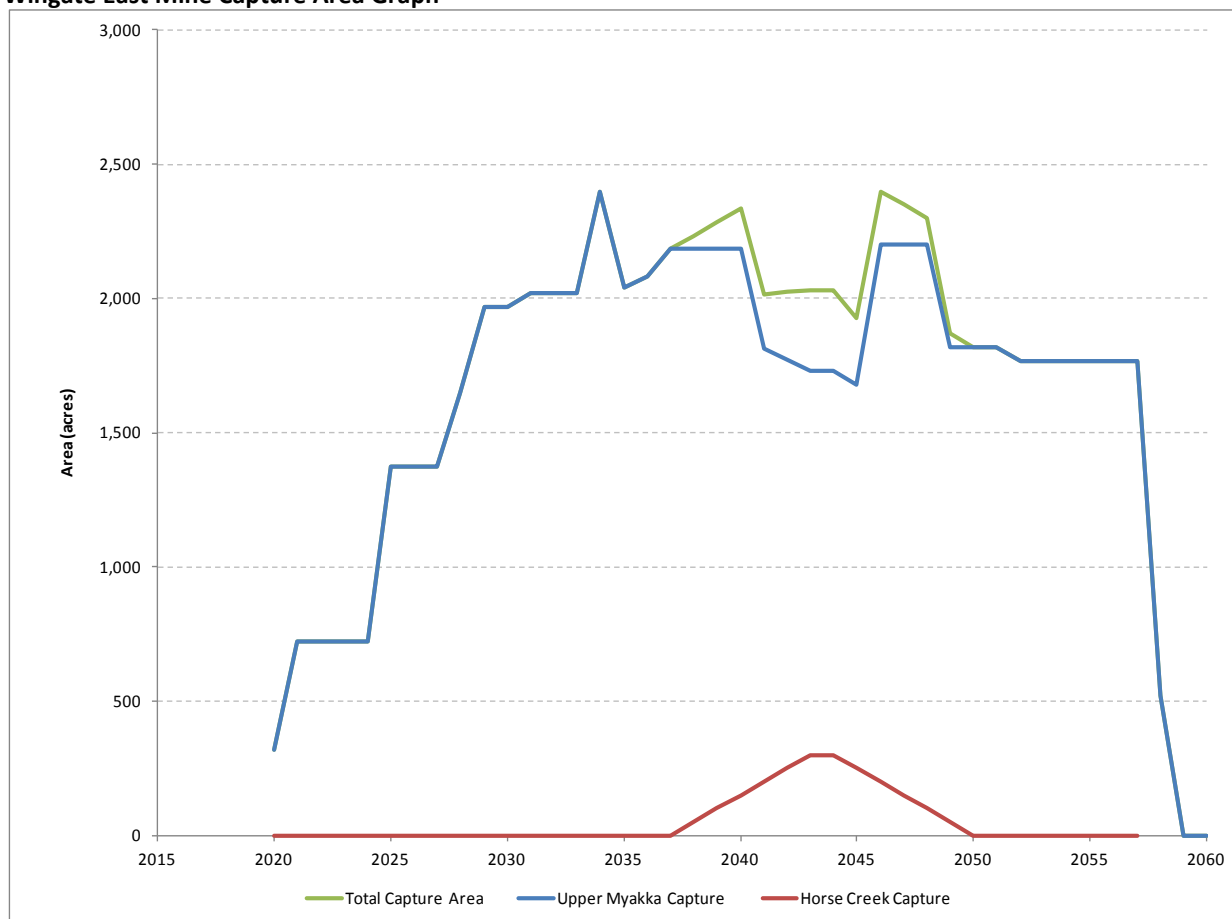
Note: Derived from the sequence of mining as provided by Mosaic in the Section 404 permit application.

4.3 Wingate East Mine

The Wingate East Mine site is almost⁷ entirely in the upper Myakka River subwatershed, with an additional portion in Horse Creek. This mine extension would use the CSAs, beneficiation plant, and mine infrastructure corridors of the Wingate Creek Mine. The capture area graph for the Wingate East Mine is presented in Figure 23. The Wingate East Mine anticipated schedule has mining to continue for the first 28 years of the mine life, and reclamation to continue to mine year 41. Mining within this extension would begin in 2020. Mine blocks east of Duette Road would be mined using a dragline (about 32 percent of the mine) and the mine blocks west of the road would be wet dredged (about 60 percent of the mine; 8 percent is unmined). The schedule indicated that wet dredging would commence about 10 years ahead of the dragline portion of the mine, but this area would not be released until near the end of the mine life. Because the wet dredge process does not facilitate the storage of additional water onsite, it was assumed that a smaller amount of capture of stormwater would occur. Reductions in surface water from the mine capture were only applied at half the area shown on the capture curve for this mine. This alternative will be reclaimed by 2060. The area of this alternative in Horse Creek is small (about 300 acres) and it was not analyzed in detail.

⁷ Wingate East is at the far northeast corner of the Myakka watershed and infringement outside this watershed's boundary would be negligible. Note that the GIS maps of the different boundaries sometimes do not match at the flat uplands at the headwaters of watersheds.

FIGURE 23

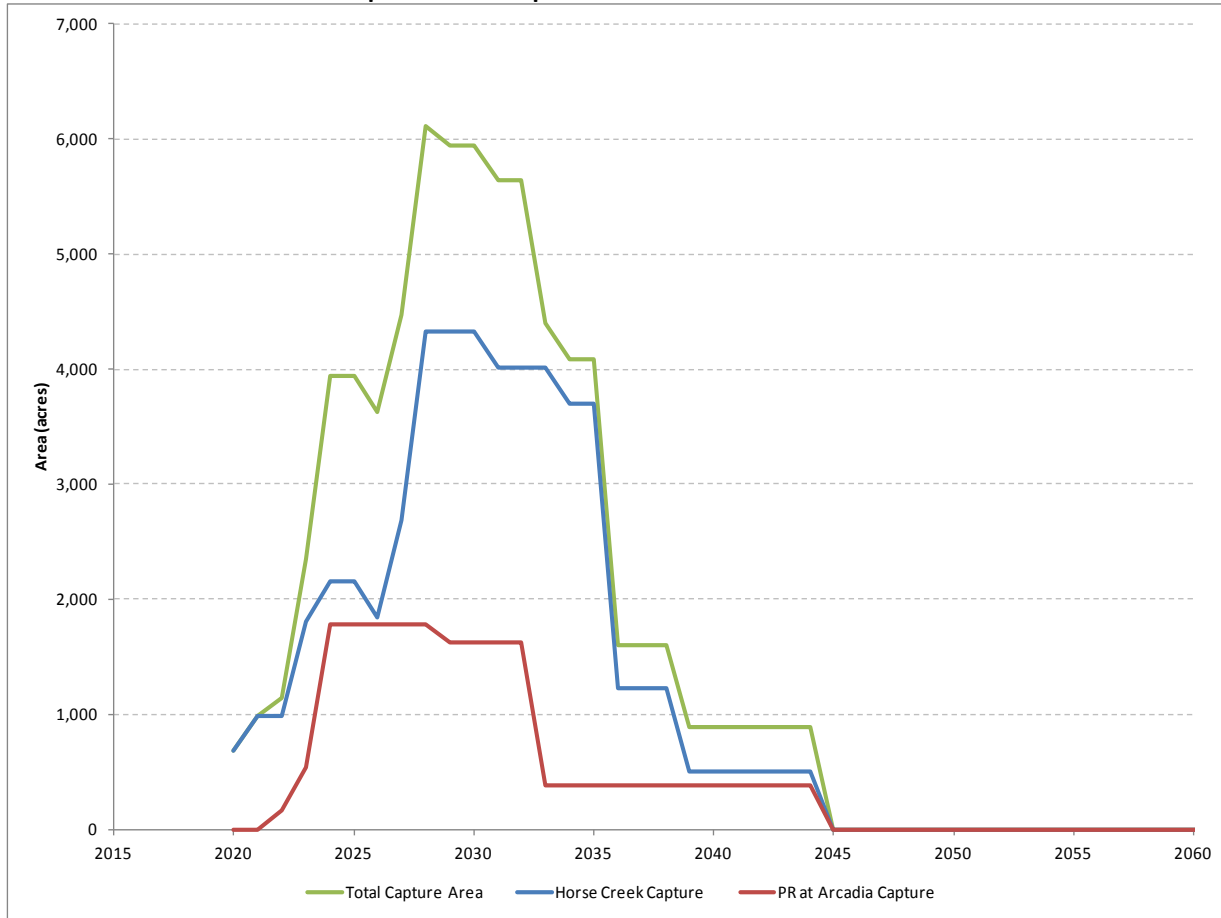
Wingate East Mine Capture Area Graph

Note: Derived from the sequence of mining as provided by Mosaic in the Section 404 permit application.

4.4 South Pasture Mine Extension

The South Pasture Mine Extension site is mostly in the Horse Creek subwatershed, with a small area within the Peace River at Arcadia and Payne Creek subwatersheds. This mine extension would initially use the CSAs and mine infrastructure corridors of the parent mine, the South Pasture Mine. The capture area graph for the South Pasture Extension is presented in Figure 24. The area of this alternative in Payne Creek is small (about 400 acres) and it was not analyzed in detail so its capture curve is not included. Mining into this extension would begin in 2020. This alternative will be reclaimed well before 2060.

FIGURE 24
South Pasture Mine Extension Capture Area Graph



Note: Derived from the sequence of mining as provided by Mosaic in the Section 404 permit application.

4.5 Pine Level/Keys Tract

The Pine Level/Keys Tract is mostly in the Myakka River watershed, specifically in the Big Slough Basin. This mine is considered a stand-alone alternative as well as an extension to the Desoto Mine. As a stand-alone mine, however, it would need a new beneficiation plant (not located in Manatee County because of a county ordinance prohibiting beneficiation plants) and a CSA that would have to be constructed prior to mining, likely delaying the date before ore can be processed.

The northeast corner of the Pine Level/Keys Tract lies in the Horse Creek subwatershed according to the GIS watershed boundary data. This area is primarily northeast of State Road 70 (about 3,055 acres) and a small area on the south side that drains eastward. There is no application for Pine Level/Keys and Mosaic indicated that it will not be able to review the site until a future date. The timing of future mining in this tract as an extension to Desoto Mine is such that the capture area would peak after most of the Applicants' Preferred Alternatives would be mined (peak impact here after 2045) and not contribute to the highest capture areas totals.

The conceptual mine plan was developed to support the analysis of direct and indirect effects of the Pine Level/Keys Tract as an independent alternative, and the analysis of its contribution to cumulative impacts as an extension to the Desoto Mine. The capture curve shown in Figure 25 was developed generically for the life of the mine and the total capture area was applied at the starting year of mining for both cases (independent or as an extension). The main difference in the two analyses is when the mining starts. For the independent analysis, the Pine Level/Keys Tract alternative was assumed to begin mining in 2025 (Figure 26). However, the time required to

secure all rights and permits, as well as to mobilize, is unknown. This alternative will be reclaimed beyond 2060 with this conceptual plan.

As an extension to Desoto Mine this alternative begins in 2034. It was assumed that the Desoto Mine CSAs would be used for the first 6 years of mining in the extension, with the following years at Pine Level/Keys Tract having new CSAs. The conceptual plan was formulated assuming that each new CSA requires 2 years for construction, 5 years for consolidation, and 3 years for reclamation (10 years total). The CSAs would be filled for approximately 2 years and rested for 1 year, and each CSA would have 3 to 5 cycles during its active life. The Desoto Mine CSAs were assumed to have capacity to manage the remaining percentage of phosphatic clays beneficiated at the Desoto plant for the startup of Pine Level/Keys Tract. If not, then a new CSA will be required sooner at Pine Level/Keys Tract, as it would if it were an independent alternative. This alternative will be reclaimed beyond 2060 with this conceptual plan, but it is started later too.

FIGURE 25

Pine Level/Keys Tract Conceptual Capture Area Graph

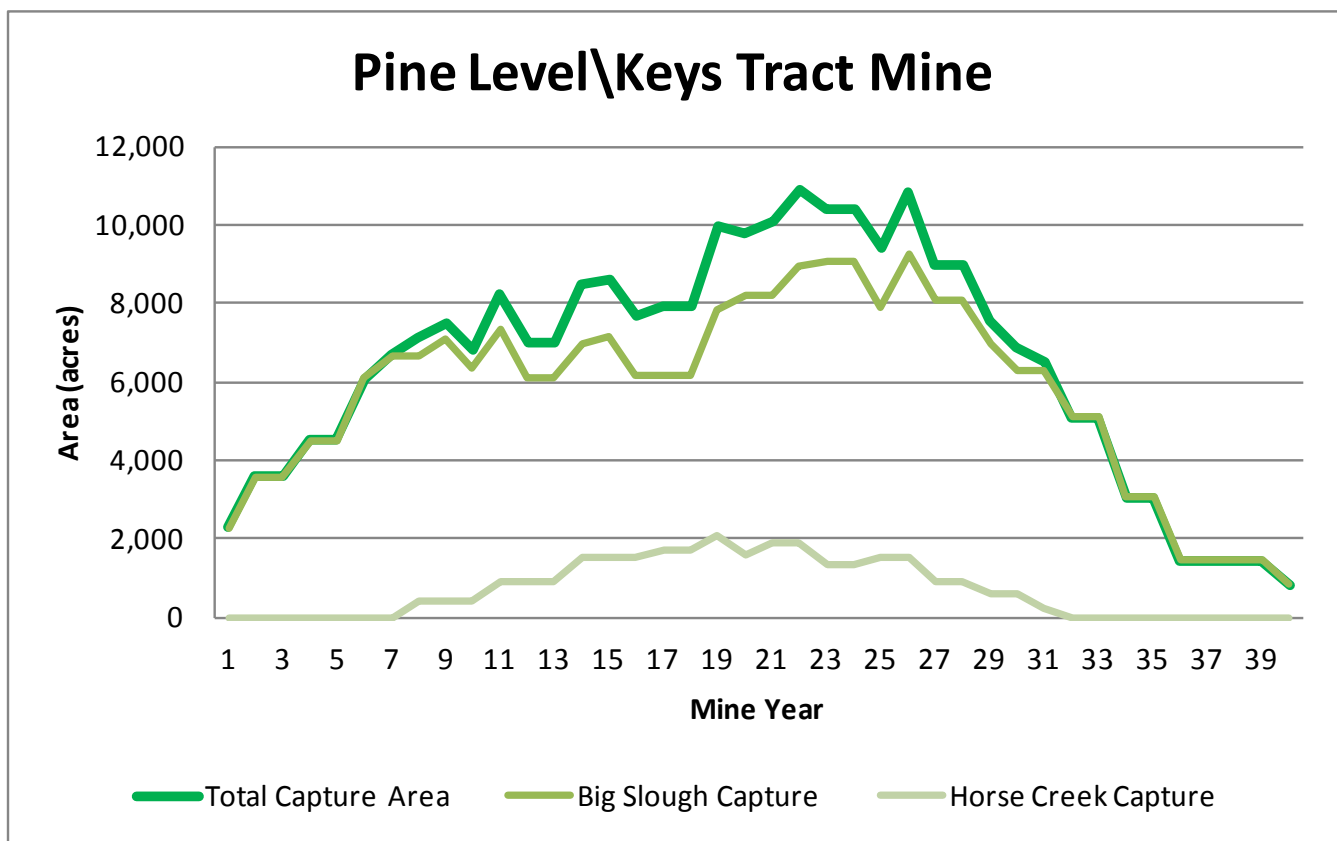
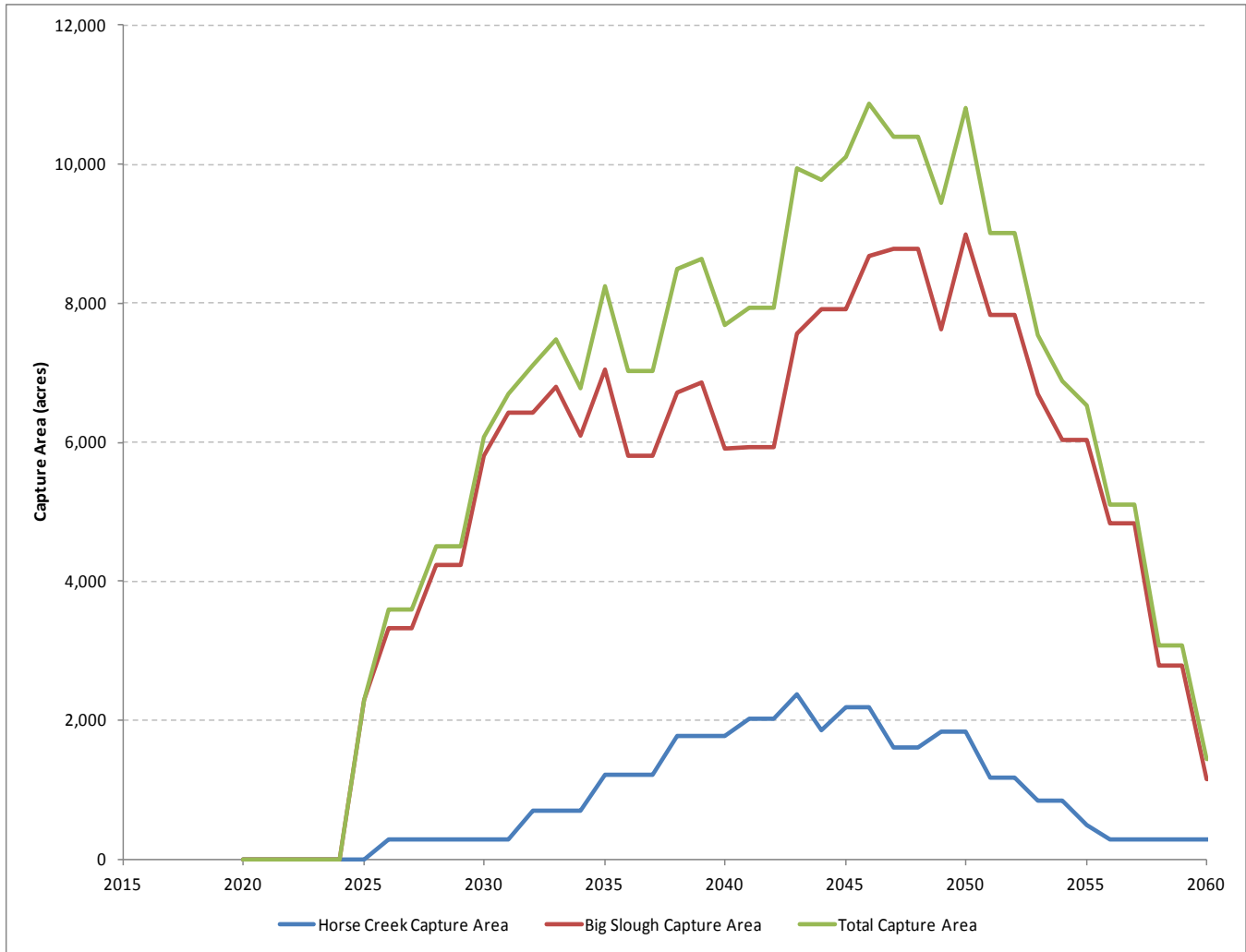


FIGURE 26

Pine Level/Keys Tract Conceptual Capture Area Graph as an Independent Alternative Beginning in 2025

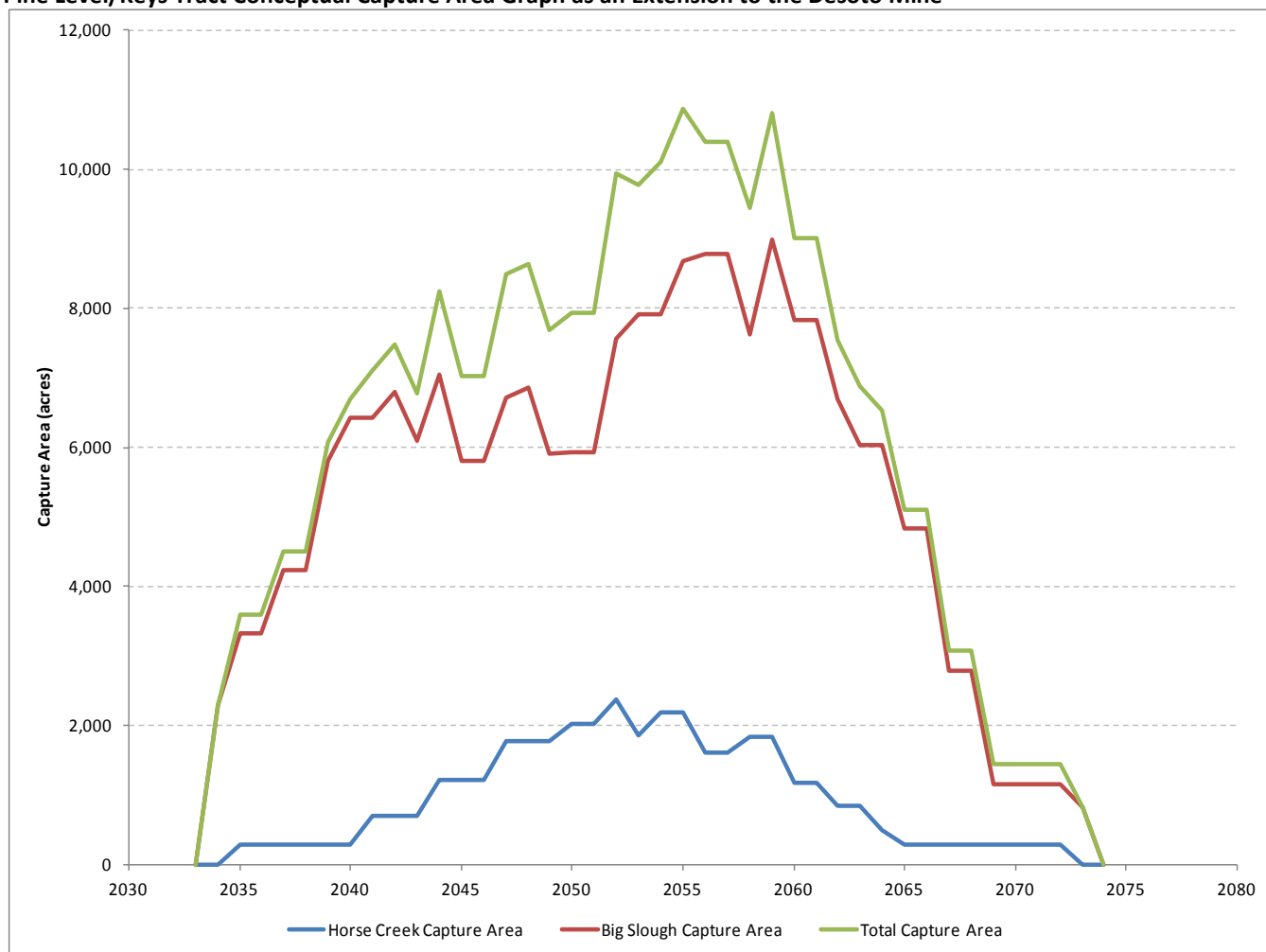
For the Pine Level/Keys Tract conceptual mine plan, the following assumptions were applied:

- Four draglines will be employed – transitioning from the south (from the Desoto Mine).
- Each dragline will excavate an average of 180 acres of active mining area per year.
- The ditch and berm system will be constructed 1 year prior to mining.
- At the end of mining, each mined-out area is filled with sand tailings – 3 years.
- Reclamation involves 2 years for recontouring and revegetation, and 1 monitoring year for vegetation establishment prior to re-connecting the area to the watershed (removing the ditch and berm system).

The capture area curve for the Pine Level/Keys Tract is shown in Figure 27 as though it were an extension or continuation of the Desoto Mine. The most likely development of this alternative as an extension would have Pine Level/Keys Tract using the Desoto beneficiation plant for separating the matrix. The conceptual mine was laid out to have the following acres, which represent typical percentages of the Pine Level/Keys Tract total mine acres based on current practice at the phosphate mines in the CFPD:

- | | | |
|----------------|-----------|-------------|
| • Total acres: | 24,509 ac | 100 percent |
| • Preserved: | 3,797 ac | 16 percent |
| • Mined: | 20,307 ac | 84 percent |
| • CSAs: | 2,817 ac | 12 percent |

FIGURE 27

Pine Level/Keys Tract Conceptual Capture Area Graph as an Extension to the Desoto Mine

Note: Derived from a conceptual mine plan assuming this land area is developed as an extension of the Desoto Mine.

4.6 Pioneer Tract

The Pioneer Tract is mostly in the Peace River watershed, split between the Horse Creek and the Peace River at Arcadia subwatersheds. As with the Pine Level/Keys Tract this mine would also most likely be an extension, in this case to the Ona Mine, but it is also being analyzed as a stand-alone alternative. As a stand-alone mine, however, a new beneficiation plant would be required prior to start of mining. A conceptual mine plan was developed to support the analysis of the potential effects of the Pioneer Tract on surface water quantities delivered downstream within the indicated subwatersheds, with the intent of estimating the mine capture area over the life of the mine. The same general assumptions about developing the conceptual mine plan for the Pine Level/Keys Tract apply here also (e.g., independently done with limited data on when it would occur, and so forth). A generic capture area curve for the life of the mine was developed and then applied to the assumed start date of the independent alternative or mine extension, depending on the analysis.

The conceptual mine plan for the Pioneer Tract is based on a layout of dragline mine years and reclamation parcels, which is based on the spatial extent of the mine and the following assumptions:

- Four draglines will be employed – transitioning from the south (from the Ona Mine).
- Each dragline will excavate an average of 200 acres of active mining area per year.
- The ditch and berm system will be constructed 1 year prior to mining.
- At the end of mining, each mined-out area is filled with sand tailings at 3 years.
- Reclamation consists of 2 years for recontouring and revegetation and 1 monitoring year for vegetation establishment prior to re-connecting the area to the watershed (removing the ditch and berm system).

The mine is assumed to use the Ona Mine CSAs for the first 8 years of mining, with the assumption that the CSAs require 2 years for construction, 5 years for consolidation, and 3 years for reclamation. The CSAs would be filled for approximately 2 years and rested for 1 year, and each CSA would have 3 to 5 cycles during its active life. The CSAs would consume approximately 29 percent of the mined land within the Pioneer Tract. If the Pioneer Tract was developed as an independent alternative, then a new onsite CSA and nearby beneficiation plant will be required which may alter the early years of the conceptual mine plan.

The mine was laid out to have the following acres, which represent typical percentages of the total mine acres as currently practiced at the phosphate mines in the CFPD:

- | | | |
|---------------|-----------|-------------|
| • Total acres | 25,231 ac | 100 percent |
| • Preserved | 3,700 ac | 15 percent |
| • Mined | 21,100 ac | 85 percent |
| • CSAs | 6,100 ac | 29 percent |

The Pioneer Tract is assumed to use the Ona beneficiation plant for beneficiating the matrix if it is implemented as an extension of Ona. The rate of reclamation would be determined by the rate of mining, the rate of sand tailings fill into the mined acres, and the final reclamation land form. For the purposes of this alternative, it was assumed that the initial release of reclamation occurs 3 years after sand tailings fill is completed.

As an independent alternative, the capture curve for the Pioneer Tract shown in Figure 28 was applied assuming that the start date of mining is 2025. The capture area curve for the Pioneer Tract as though it were an extension or continuation of the Ona Mine beginning in 2048 is shown in Figure 29. In either conceptual plan, the alternative will be reclaimed beyond 2060.

FIGURE 28

Pioneer Tract Conceptual Capture Area Graph as an Independent Alternative Beginning in 2025

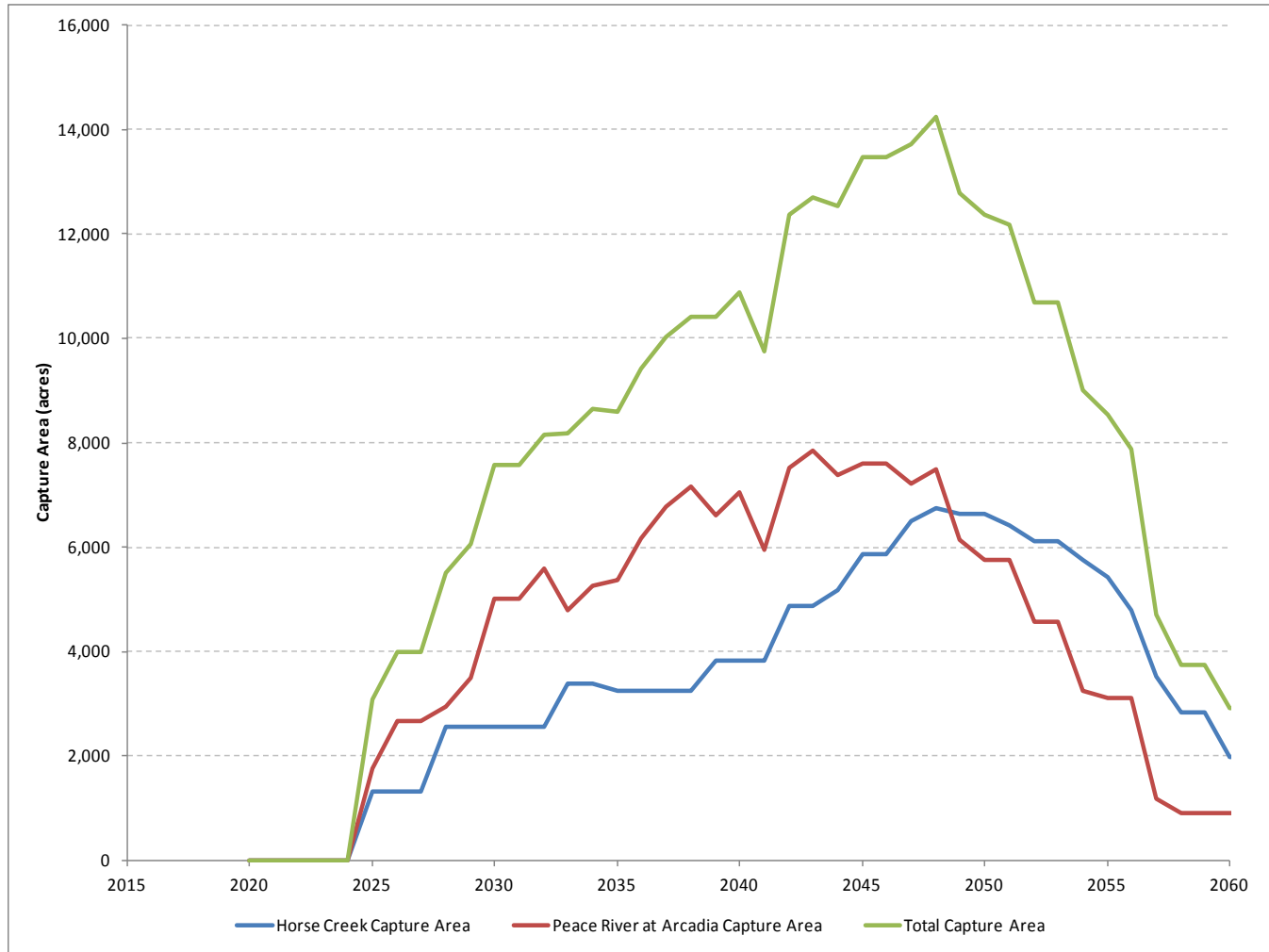
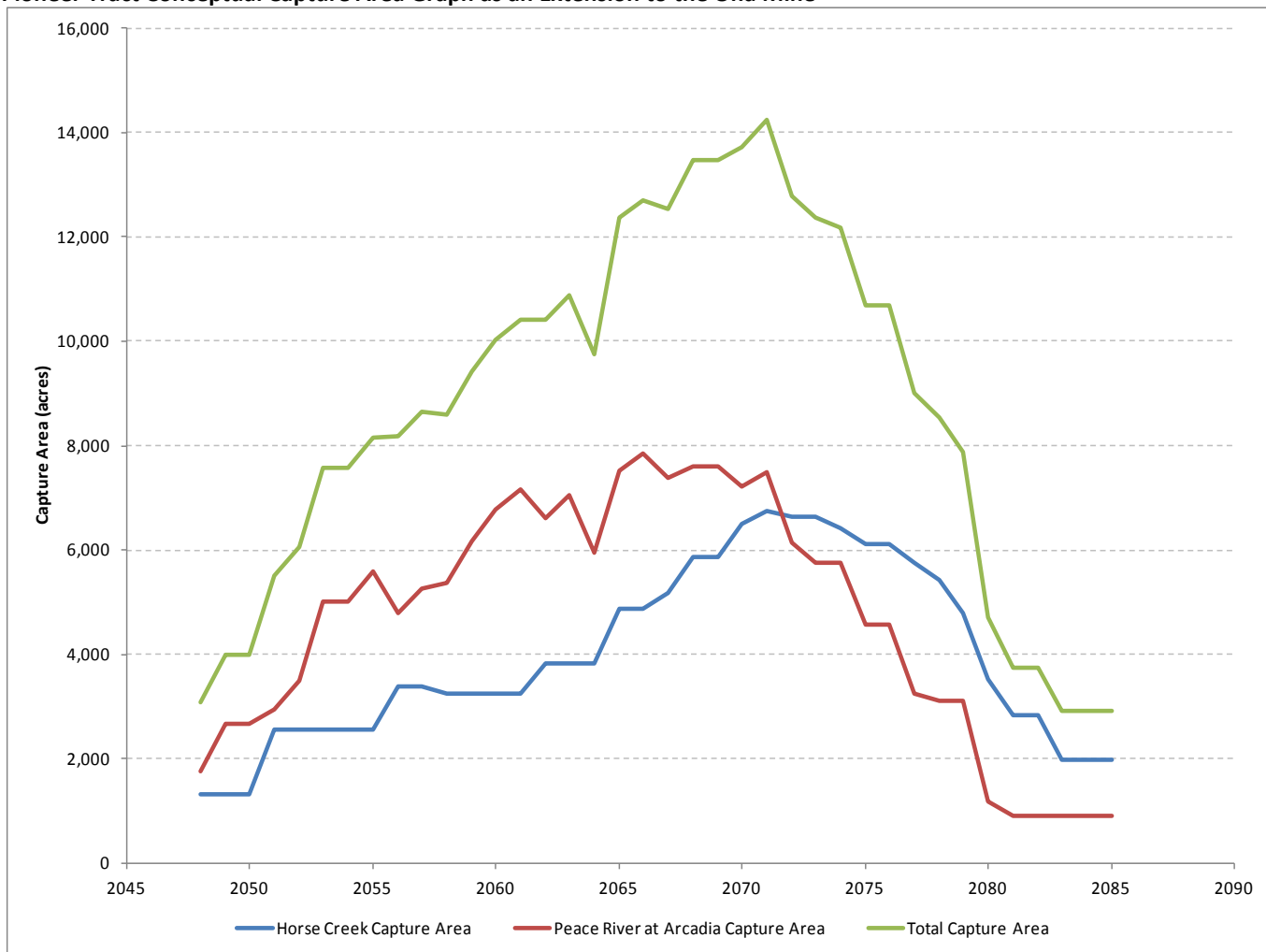


FIGURE 29

Pioneer Tract Conceptual Capture Area Graph as an Extension to the Ona Mine

Note: Derived from a conceptual mine plan assuming this land area is developed as an extension of the Ona Mine.

5.0 Stream Flow Projections and Evaluation of Hydrologic Impacts on Surface Water Delivery

An evaluation of runoff characteristics and flow projections for each subwatershed was conducted with the projected land use changes through 2060 and the capture area analysis for each of the alternatives analyzed quantitatively. Projections were made for individual alternatives and the combined effect of multiple alternative mines operating at the same time (that is, all mining alternatives operating as scheduled, including the Pine Level/Keys and Pioneer Tracts that would most likely operate as extensions of adjacent mines). The predicted effects on each subwatershed and on the entire watershed are presented in this section. This evaluation involved calculating area-weighted average runoff coefficients for each subwatershed for 2020, 2030, 2040, 2050, and 2060 for each corresponding land use projection and capture area schedule for each mine. In some instances, 2035 and 2045 years were estimated to be sure that peak capture conditions were estimated and included, as described below. The analysis was conducted for wet and the dry seasons during an average rainfall year, and for wet and dry seasons during a low rainfall year. The impact of the mines on downstream surface water delivery was estimated with all of the stormwater within the capture area being retained (100 percent capture) and half of the onsite stormwater retained (50 percent capture).

For each analysis described in this section, a spreadsheet-based computation was conducted by applying precipitation to the area-weighted runoff coefficients derived from the many soil/land use polygons. The mine

capture area curves were applied for each time period on each subwatershed to remove that amount of area from contributing flow. The 50 percent capture analysis was conducted based on runoff from half of the mine area captured, where the 100 percent capture case removed the entire active mine's area from the flow prediction. A revised area-weighted runoff coefficient for the subwatershed without that land area was computed to evaluate the change to the coefficient for discussion purposes. Each mine was analyzed individually, and the combined effects of multiple mines operating with overlapping periods of activity were also evaluated for consideration in the cumulative impacts section of the AEIS.

This section in the TM is divided as follows:

- No Action Alternative
- Desoto Mine
- Ona Mine
- Wingate East Mine
- South Pasture Mine Extension
- Pine Level/Keys Tract
- Pioneer Tract
- Site A-2 and Site W-2
- Cumulative Impacts to Stream Flows at:
 - Horse Creek
 - Peace River at Arcadia
 - Upper Charlotte Harbor
 - Peace River contribution
 - Myakka River contribution
 - Peace and Myakka River combined

With each analysis, the effect of individual mines may be small, but the combined additive effect estimated with all Applicants' Preferred Alternatives operating, including the Pine Level/Keys and Pioneer Tracts, presents the largest potential impact in the Peace River. When the capture curves were added together, the highest area captured in Horse Creek was around 2035; thus, a 2035 year estimate was added to the results in this subwatershed. The combined effect of mining on the Myakka River is addressed by the individual mines (Wingate East and Pine Level/Keys) since there are not multiple mines operating in the same river/creek reach at the same time (i.e., both flow directly into Charlotte Harbor). A range of analyses are presented in this section so different mines can be documented using both conservative and extreme assumptions during both average and low rainfall conditions. Low rainfall conditions were estimated as the 20th percentile of the annual rainfall totals for the period of record (i.e., 80 percent of the years had higher rainfall) as described previously. Additional analyses are presented in Section 6 on low flow effects on the utilities that use surface water as part of their source.

Two offsite alternatives, Site A-2 and W-2, did not have their impact computed quantitatively. Since there was no information about their potential mining potential, it was determined that it would be too speculative to generate a plan (schedule). However, these two sites are discussed qualitatively by comparing their location and size to the other alternatives' impacts. From Table 9, some of the watershed and alternative boundaries overlap such that there are small areas that may reside in adjacent subwatersheds on the maps, but it is uncertain how accurate these boundaries are. For areas less than about 500 acres, the impact on flow would be less than 1 cfs under average rainfall conditions. These areas are minor, differences would be hard to detect, and are within rounding errors of the calculations. A 50 percent capture rate would be proportionately smaller. This section provides the estimates of impacts in context of future land use change.

5.1 No Action Alternative Impacts on Runoff Characteristics and Stream Flow

The No Action Alternative conditions are defined in Chapter 2 of the AEIS whereby Section 404 permits would be denied but the applicants could modify their plans to mine in upland areas where reasonable to do so. So while the No Action Alternative does not prohibit all mining, the area being mined would be less than under the Applicants' Preferred Alternatives or the offsite alternatives. To create the most conservative case for the No

Action Alternative to determine maximum impact, it was assumed that no mining would take place. This assumption results in the maximum differences in flow rates when comparing No Action Alternative conditions to any of the Applicants' Preferred Alternatives or offsite alternatives. Therefore, all No Action results listed here are for No Action, No Mining.

As discussed previously, the land use and its effect on the runoff coefficients was the variable that changed in the No Action Alternative. These changes included allowing the existing mines to return to a mixture of agricultural, urban, and natural land uses according to their scheduled completion. This change resulted in an increase in flow rates in most subwatersheds as follows:

- Peace River at Arcadia, 9.8 percent increase;
- Horse Creek, 3.5 percent increase;
- Peace River, 11.1 percent increase;
- Upper Myakka River 14.8 percent increase; and
- Entire Myakka River watershed, 5.3 percent increase.

The increase in flow was higher in the upper Myakka River subwatershed because the historical trend has been higher. Big Slough Basin was not estimated to change because there are no existing mines in this subwatershed and the urban development here is clustered around a canal system near Charlotte Harbor. Growth in the subwatershed will occur but it is unknown how the drainage patterns through the canals will affect flow near Myakkahatchee Creek. The SWFWMD has delayed developing a minimum flow and level (MFL) study on Myakkahatchee Creek because of the complicated flow patterns and lack of available data. Consequently, the No Action Alternative for Big Slough subwatershed assumed constant future runoff conditions.

The flow in the Peace River, as well as in all subwatersheds in west-central Florida, is highly variable and dependent on rainfall (see Section 2.4.2 above). The USGS has studied the yield of surface water in several subwatersheds and determined that there are periods of time when stream flow can be very low or cease flowing when the groundwater levels are low. However, this occurs primarily in river segments north of Fort Meade (Metz and Lewelling, 2009). In general, both the Peace and Myakka River watersheds are much larger than the area that would be impacted by the Applicants' Preferred Alternatives or offsite alternatives, either individually or combined. Peace River at Arcadia flow includes upstream contributing areas Peace River at Zolfo Springs (and northward), Charlie Creek, and Payne Creek. Horse Creek, Joshua Creek, and Prairie Creek (includes Shell Creek), and Peace River at Arcadia contribute to the Charlotte Harbor. The upper Myakka River and lower Myakka River subwatersheds are defined to be separated at the USGS gage near Sarasota. Big Slough Basin is a subwatershed in the lower Myakka River subwatershed.

The estimated No Action Alternative flow conditions for the average annual rainfall is presented in Tables 10 through 12 and the low rainfall years in Tables 13 through 15. Each prediction was based on runoff coefficients allocated to the soil type and land use as described previously in Section 2.3 of this TM. The flow conditions are provided for both wet and dry seasons and for the annual average flow at each 10-year increment. These data were used to compare the mining alternatives discussed in the remainder of this section and they are plotted alongside each alternative presented.

5.2 Desoto Mine Impacts on Runoff Characteristics and Stream Flow

The effects of the Desoto Mine were calculated by changing the runoff coefficients in the Horse Creek and Peace River at Arcadia subwatersheds with this mine's capture area accounted for over the life cycle of the mine. The projected flows and percent change from 2009 levels was estimated seasonally and annually for 100 percent capture of the capture area runoff and for 50 percent capture of the capture area runoff. Projections were also performed for an average rainfall year and for a low rainfall year. The capture curves indicate that the most area under surface water management controls for this alternative is around 2035 for the Horse Creek subwatershed, and around 2030 for the Peace River at Arcadia subwatershed. Therefore, an extra analysis was conducted for 2035 in Horse Creek to evaluate the near peak capture conditions.

5.2.1 Desoto Mine Impacts on Horse Creek

Table 16 presents the projected flows and percent change from 2009 average annual and seasonal flows during an average rainfall year with 100 percent capture of stormwater in the capture area of the Desoto Mine at the Horse Creek flow station (i.e., near Arcadia). The maximum influence was predicted to occur around 2035, when annual average flow decreases by approximately 8 percent, dry season flow decreases by approximately 9 percent, and wet season flow decreases by approximately 6 percent from 2009 levels when compared to the current (2009) land use. However, because of projected changes in land use within this watershed, flows are predicted to increase from 2009 levels by 2060.

Table 17 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 50 percent capture of stormwater in the capture area of the Desoto Mine at the Horse Creek flow station. The maximum influence was predicted to occur around 2035, when annual average flow decreases by approximately 3 percent, dry season flow decreases by approximately 4 percent, and wet season flow decreases by approximately 1 percent from 2009 levels. However, when considering only the Desoto Mine, because of projected changes in land use within this watershed, annual average flows are predicted to increase by approximately 3 percent when compared to 2009 flows with a 2 percent increase in dry season flows and a 5 percent increase in wet weather flows by 2060.

The same type of evaluation was performed for a low rainfall year. For the Desoto Mine analysis, this low rainfall calculation used 43 inches of rainfall per year.

Table 18 presents the flows and percent change from 2009 average annual and seasonal flows during a low rainfall year with 100 percent capture of stormwater in the capture area of the Desoto Mine at the Horse Creek flow station. The maximum influence was predicted to occur around 2035, when annual average flow decreases by approximately 8 percent, dry season flow decreases by approximately 9 percent, and wet season flow decreases by approximately 6 percent from 2009 levels. However, because of projected changes in land use within this watershed, flows are predicted to increase from 2009 levels by 2060. These results are about the same relative percentage as for an average year's wet season, but the dry season value is 2 cfs lower by 2035.

Table 19 presents the flows and percent change from 2009 average annual and seasonal flows during a low rainfall year with 50 percent capture of stormwater in the capture area of the Desoto Mine at the Horse Creek flow station. The maximum influence was predicted to occur around 2035, when annual average flow decreases by approximately 3 percent, dry season flow decreases by approximately 4 percent, and wet season flow decreases by approximately 1 percent from 2009 levels. However, when considering only the Desoto Mine, because of projected changes in land use within this watershed, annual average flows are predicted to increase by approximately 3 percent when compared to 2009 flows with a 2 percent increase in dry season flow (2 cfs) and a 4 percent increase in wet season flow (9 cfs) by 2060.

To illustrate the effect on Horse Creek stream flow under the conditions and scenarios evaluated, the results are presented graphically and compared to the No Action Alternative conditions. Figures 30 and 31 present the seasonal and annual average flows calculated for the Horse Creek gage station with and without the Desoto Mine based on 100 percent capture and 50 percent capture of stormwater, respectively, during average rainfall conditions. One standard deviation above and below the historical mean flow is presented to illustrate the historical range in annual stream flow.

TABLE 10

No Action Alternative - Predicted Conditions in the Peace River Subwatersheds for an Average Rainfall Year

Year	Peace River at Arcadia			Joshua Creek			Horse Creek			Prairie Creek			Peace River to Charlotte Harbor		
	Qannual (cfs)	Qdry (cfs)	Qwet (cfs)	Qannual (cfs)	Qdry (cfs)	Qwet (cfs)	Qannual (cfs)	Qdry (cfs)	Qwet (cfs)	Qannual (cfs)	Qdry (cfs)	Qwet (cfs)	Qannual (cfs)	Qdry (cfs)	Qwet (cfs)
2009	713	328	1,657	90	40	222	171	78	404	145	65	348	1,119	510	2,631
2020	726	332	1,702	95	43	232	173	78	413	151	68	362	1,145	520	2,709
2030	738	336	1,743	99	44	239	173	78	416	158	71	375	1,168	529	2,774
2040	754	343	1,785	102	46	246	174	78	419	164	75	389	1,195	541	2,840
2050	772	351	1,829	105	47	252	175	79	422	171	78	403	1,223	554	2,906
2060	783	355	1,858	107	48	257	177	79	424	177	81	416	1,244	564	2,955

Wet season is from June through September, and the dry season is the rest of the year. Annual flow is average value for given annual precipitation total.

Rainfall is based on long term monthly averages.

Average rainfall year has 50 inches in the Peace River watershed.

TABLE 11

No Action Alternative – Predicted Conditions in the Myakka River Subwatersheds for an Average Rainfall Year

Year	Upper Myakka River			Big Slough Basin			Lower Myakka River (incl. Big Slough Basin)			Myakka River to Charlotte Harbor		
	Qannual (cfs)	Qdry (cfs)	Qwet (cfs)	Qannual (cfs)	Qdry (cfs)	Qwet (cfs)	Qannual (cfs)	Qdry (cfs)	Qwet (cfs)	Qannual (cfs)	Qdry (cfs)	Qwet (cfs)
2009	243	109	589	217	117	629	432	128	664	675	237	1,253
2020	252	113	608	217	117	629	432	128	664	684	241	1,272
2030	259	116	624	217	117	629	432	128	664	690	244	1,288
2040	265	119	640	217	117	629	432	128	664	697	247	1,304
2050	272	122	655	217	117	629	432	128	664	704	250	1,319
2060	279	125	671	217	117	629	432	128	664	711	253	1,335

Average rainfall year has 53 inches in the Myakka River watershed.

TABLE 12

No Action Alternative – Predicted Conditions in the Upper Charlotte Harbor for an Average Rainfall Year

Year	Charlotte Harbor Average Year Annual			Charlotte Harbor Average Year Dry Season			Charlotte Harbor Average Year Wet Season		
	Peace River (cfs)	Myakka River (cfs)	Total (cfs)	Peace River (cfs)	Myakka River (cfs)	Total (cfs)	Peace River (cfs)	Myakka River (cfs)	Total (cfs)
2009	1,119	675	1,794	510	237	747	2,631	1,253	3,884
2020	1,145	684	1,829	520	241	761	2,709	1,272	3,981
2030	1,168	690	1,858	529	244	773	2,774	1,288	4,062
2040	1,195	697	1,892	541	247	788	2,840	1,304	4,143
2050	1,223	704	1,928	554	250	805	2,906	1,319	4,225
2060	1,244	711	1,955	564	253	817	2,955	1,335	4,290

TABLE 13

No Action Alternative -Predicted Conditions in the Peace River Subwatersheds for a Low Rainfall Year

Year	Peace River at Arcadia			Joshua Creek			Horse Creek			Prairie Creek			Peace River to Charlotte Harbor		
	Qannual (cfs)	Qdry (cfs)	Qwet (cfs)	Qannual (cfs)	Qdry (cfs)	Qwet (cfs)	Qannual (cfs)	Qdry (cfs)	Qwet (cfs)	Qannual (cfs)	Qdry (cfs)	Qwet (cfs)	Qannual (cfs)	Qdry (cfs)	Qwet (cfs)
2009	330	152	766	60	27	148	84	38	199	93	42	225	568	259	1,338
2020	337	154	787	64	28	155	85	38	203	97	44	233	583	264	1,379
2030	342	156	807	66	30	160	85	38	205	102	46	242	595	270	1,414
2040	350	159	827	68	31	164	86	39	206	106	48	251	610	276	1,449
2050	358	163	848	70	32	169	86	39	207	110	50	260	625	283	1,484
2060	363	165	862	72	32	172	87	39	209	114	52	268	636	288	1,511

Wet season is from June through September, and the dry season is the rest of the year. Annual flow is average value for given annual precipitation total.

Rainfall is based on the lowest 20th percentile of long term annual averages, which is similar to SWFWMD permitting basis for irrigation use.

Low rainfall year has 43 inches in the Peace River watershed.

TABLE 14

No Action Alternative - Predicted Conditions in the Myakka River Subwatersheds for a Low Rainfall Year

Year	Upper Myakka River			Big Slough Basin			Lower Myakka River (incl. Big Slough Basin)			Myakka River to Charlotte Harbor		
	Qannual (cfs)	Qdry (cfs)	Qwet (cfs)	Qannual (cfs)	Qdry (cfs)	Qwet (cfs)	Qannual (cfs)	Qdry (cfs)	Qwet (cfs)	Qannual (cfs)	Qdry (cfs)	Qwet (cfs)
2009	204	91	493	176	95	511	350	104	539	555	195	1,032
2020	204	91	493	176	95	511	350	104	539	555	195	1,032
2030	210	94	506	176	95	511	350	104	539	560	198	1,045
2040	215	97	519	176	95	511	350	104	539	566	200	1,058
2050	221	99	532	176	95	511	350	104	539	571	203	1,070
2060	226	102	544	176	95	511	350	104	539	577	206	1,083

Low rainfall year has 43 inches in the Myakka River watershed.

TABLE 15

No Action Alternative - Predicted Conditions in the Upper Charlotte Harbor for a Low Rainfall Year

Year	Charlotte Harbor Average Year Annual			Charlotte Harbor Average Year Dry Season			Charlotte Harbor Average Year Wet Season		
	Peace River (cfs)	Myakka River (cfs)	Total (cfs)	Peace River (cfs)	Myakka River (cfs)	Total (cfs)	Peace River (cfs)	Myakka River (cfs)	Total (cfs)
2009	568	555	1,122	259	195	454	1,338	1,032	2,369
2020	583	555	1,137	264	195	460	1,379	1,032	2,411
2030	595	560	1,155	270	198	467	1,414	1,045	2,458
2040	610	566	1,175	276	200	477	1,449	1,058	2,507
2050	625	571	1,196	283	203	486	1,484	1,070	2,554
2060	636	577	1,213	288	206	494	1,511	1,083	2,593

TABLE 16

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 100 Percent Capture at the Horse Creek Flow Station with the Desoto Mine

Year	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	171	0%	78	0%	404	0%
2020	173	1%	78	0%	413	2%
2030	161	-6%	72	-7%	387	-4%
2035	157	-8%	71	-9%	378	-6%
2040	164	-4%	74	-5%	394	-2%
2050	175	3%	79	2%	422	4%
2060	177	3%	79	2%	424	5%

TABLE 17

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 50 Percent Capture at the Horse Creek Flow Station with the Desoto Mine

Year	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	171	0%	78	0%	404	0%
2020	173	1%	78	0%	413	2%
2030	167	-2%	75	-3%	401	-1%
2035	166	-3%	75	-4%	399	-1%
2040	169	-1%	76	-2%	407	1%
2050	175	3%	79	2%	422	4%
2060	177	3%	79	2%	424	5%

TABLE 18

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 100 Percent Capture at the Horse Creek Flow Station with the Desoto Mine

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	84	0%	38	0%	199	0%
2020	85	1%	38	0%	203	2%
2030	79	-6%	36	-7%	190	-4%
2035	77	-8%	35	-9%	186	-6%
2040	81	-4%	36	-5%	194	-2%
2050	86	3%	39	2%	207	4%
2060	87	3%	39	2%	209	5%

TABLE 19

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 50 Percent Capture at the Horse Creek Flow Station with the Desoto Mine

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	84	0%	38	0%	199	0%
2020	85	1%	38	0%	203	2%
2030	82	-2%	37	-3%	197	-1%
2035	82	-3%	37	-4%	196	-1%
2040	83	-1%	37	-2%	200	1%
2050	86	3%	39	2%	207	4%
2060	87	3%	39	2%	209	5%

FIGURE 30

Horse Creek Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without Desoto Mine

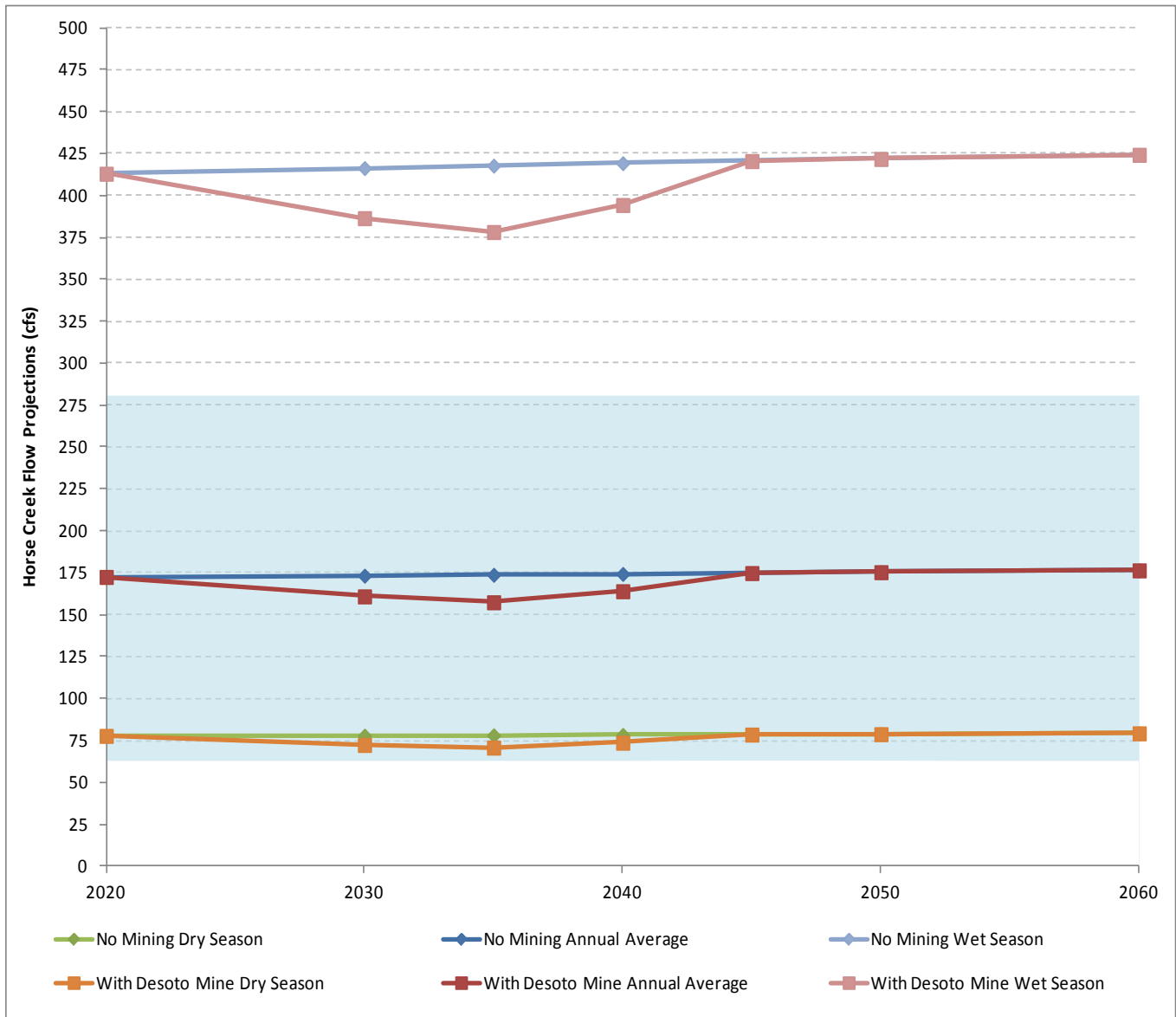
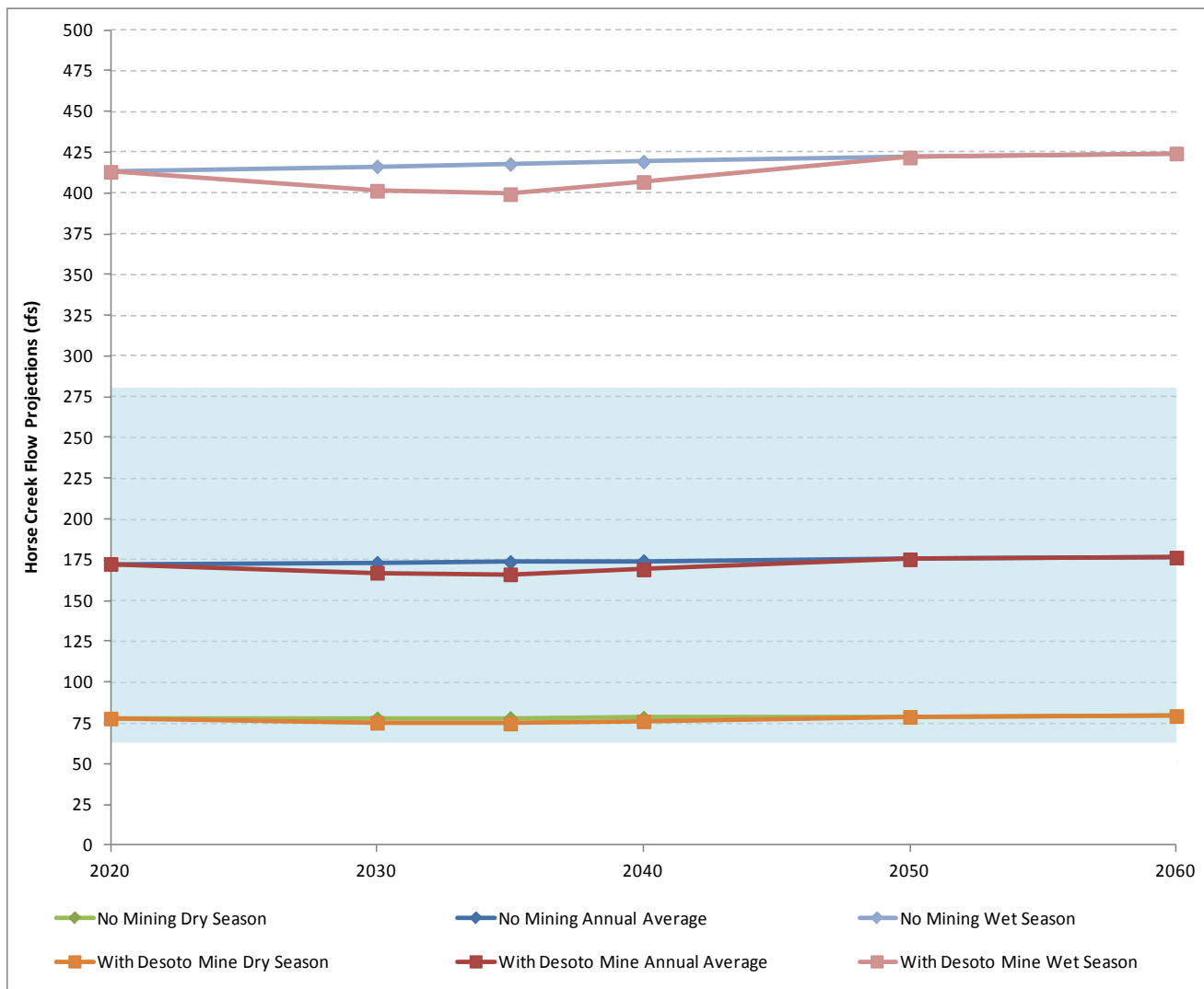


FIGURE 31

Horse Creek Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without Desoto Mine



The largest influence on annual average flow from the Horse Creek subwatershed during average rainfall conditions was predicted to occur around 2035. Based on 100 percent capture of stormwater, Horse Creek may have an average annual flow of approximately 173 cfs without the Desoto Mine, and approximately 157 cfs with the Desoto Mine. Assuming a 50 percent capture of stormwater, Horse Creek may have an average annual flow of approximately 166 cfs. This corresponds to a decrease in flow of about 7 cfs when compared to the No Action Alternative conditions.

Figures 32 and 33 present the seasonal and annual average flows calculated for the Horse Creek gage station with and without the Desoto Mine based on 100 percent capture and 50 percent capture of stormwater, respectively, during low rainfall conditions. One standard deviation above and below the historical mean flow is presented to illustrate the historical range in annual stream flow. Since about 33 percent of the annual data falls outside of one standard deviation, it is not unusual for the dry season of a dry year to fall outside of this shaded range. However, note that even with a low 20th percentile rainfall, the projected annual flow is within one standard deviation.

FIGURE 32

Horse Creek Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without Desoto Mine

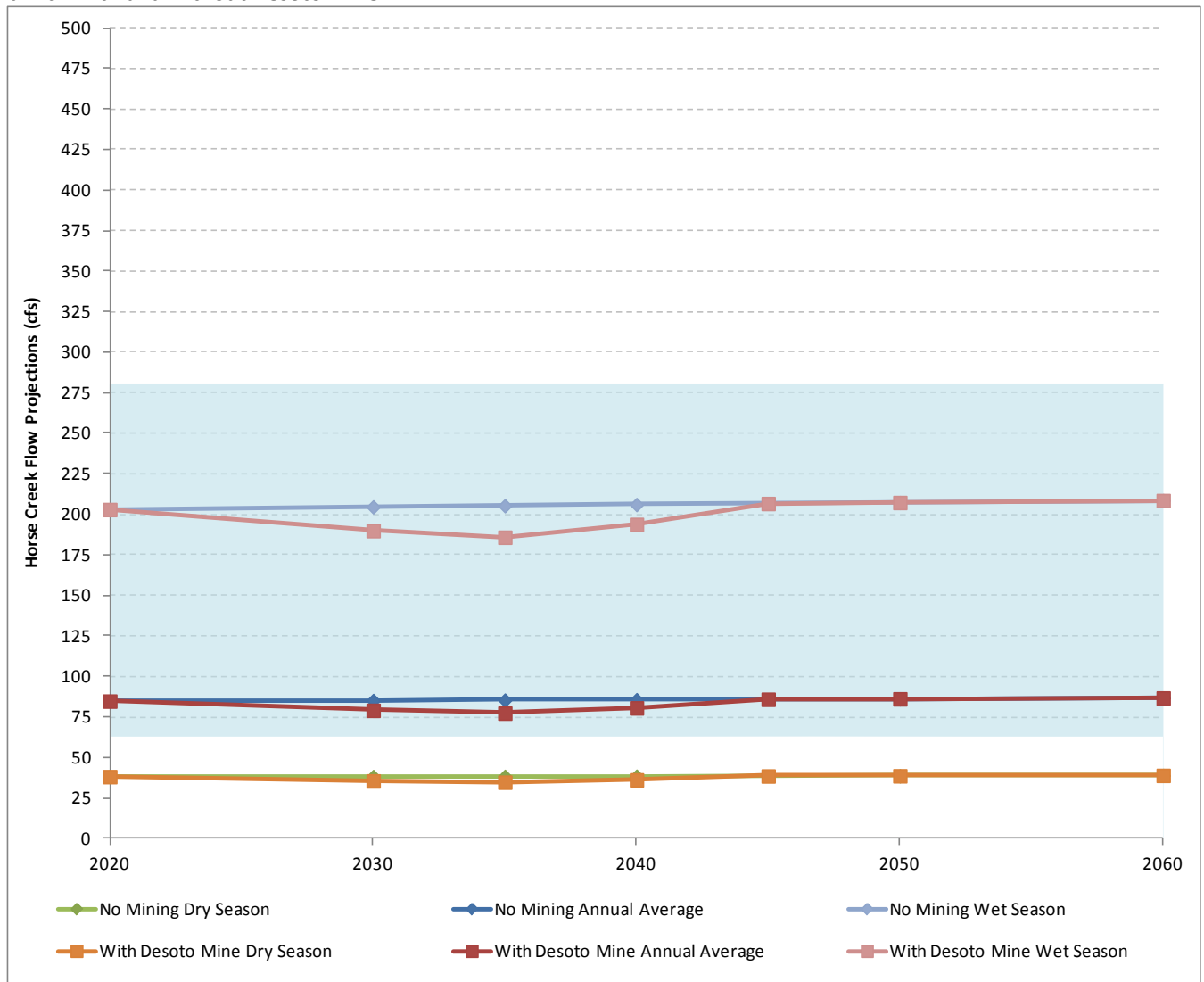
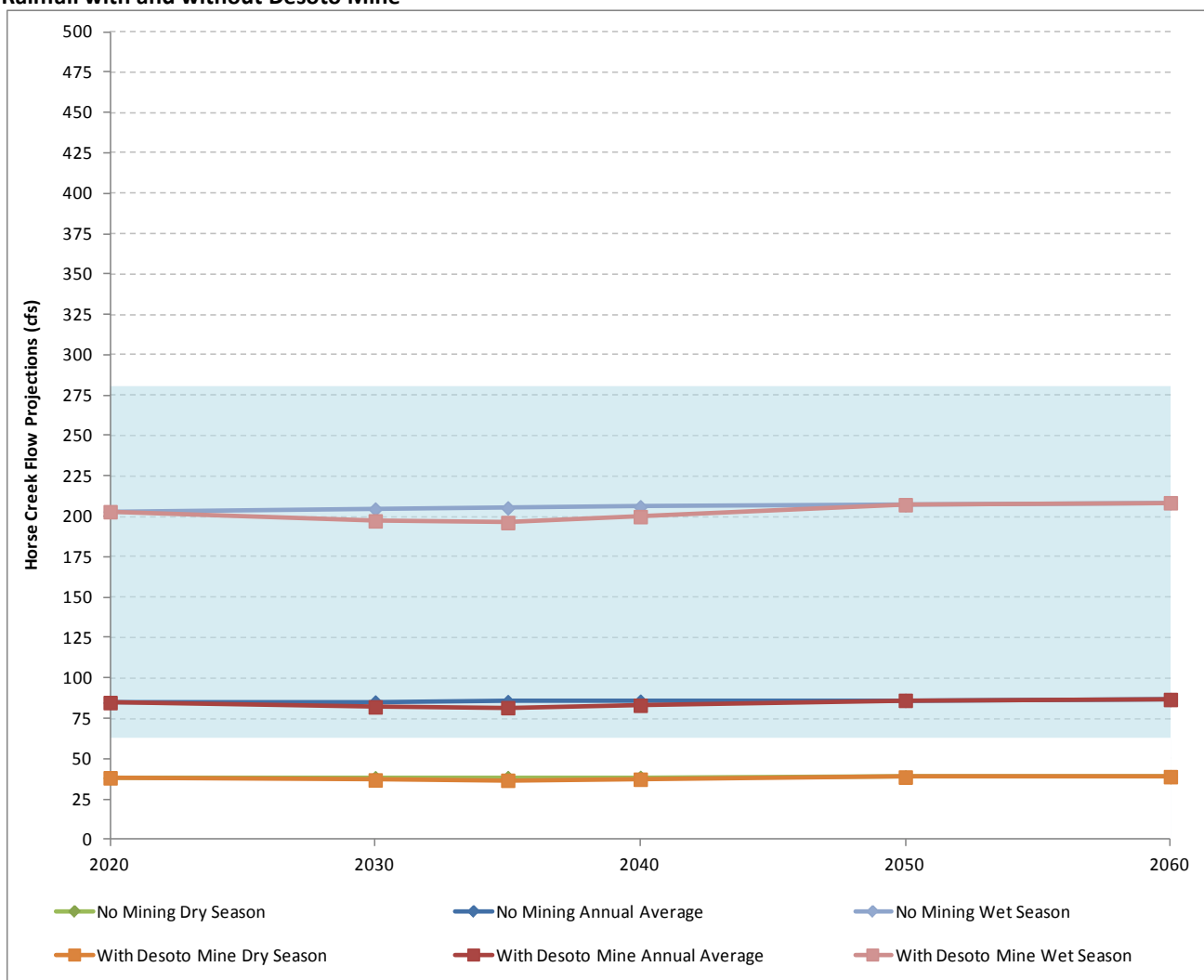


FIGURE 33

Horse Creek Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without Desoto Mine

Similar to average rainfall conditions, the largest influence on annual average flow from the Horse Creek subwatershed during low rainfall conditions was predicted to occur around 2035. Based on 100 percent capture of stormwater, Horse Creek may have an average annual flow of approximately 85 cfs without the Desoto Mine, and approximately 77 cfs with the Desoto Mine. Assuming a 50 percent capture of stormwater, Horse Creek may have an average annual flow of approximately 82 cfs. This corresponds to a decrease in flow of 3 cfs when compared to the No Action Alternative conditions.

5.2.2 Desoto Mine Impacts on Peace River at Arcadia

Table 20 presents the flows and percent change from 2009 average annual and seasonal flows during an average rainfall year with 100 percent capture of stormwater in the capture area of the Desoto Mine at the Peace River at Arcadia flow station. The maximum influence was predicted to occur around 2030. However, based on projected land use changes within the subwatershed and upstream subwatersheds, flows are predicted to increase during the Desoto mining period. Annual average flow increases by approximately 3 percent during the period of 2030, dry season flow increases by approximately 2 percent, and wet season flow increases by approximately 5 percent from 2009 levels. Flows are predicted to increase from 2009 levels by approximately 10 percent by 2060. Because of the small percentage of land that would be mined compared to the total drainage area of this gage station, the changes in projected land use are predicted to have more of an effect on flow than the Desoto Mine capture.

TABLE 20

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 100 Percent Capture at the Peace River at Arcadia Flow Station with the Desoto Mine

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	713	0%	328	0%	1,657	0%
2020	726	2%	332	1%	1,702	3%
2030	737	3%	335	2%	1,740	5%
2040	754	6%	343	5%	1,785	8%
2050	772	8%	351	7%	1,829	10%
2060	783	10%	355	8%	1,858	12%

Table 21 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 50 percent capture of stormwater in the capture area of the Desoto Mine at the Peace River at Arcadia gage station. The maximum influence was predicted to occur around 2030. However, similar to the 100 percent capture case, based on land use changes within the subwatershed and upstream subwatersheds, flows are predicted to increase during the Desoto mining period. Annual average flow increases by approximately 3 percent during the period of 2030, dry season flow increases by approximately 2 percent, and wet season flow increases by approximately 5 percent from 2009 levels. Flows are predicted to increase from 2009 levels by approximately 10 percent by 2060. Again, the small percentage of land that would be mined compared to the total drainage area of this gage station causes the predicted changes in land use to have more of an effect on flow than the Desoto Mine capture, and flows are projected to be the about the same as in the 100 percent capture case.

TABLE 21

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 50 Percent Capture at the Peace River at Arcadia Flow Station with the Desoto Mine

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	713	0%	328	0%	1,657	0%
2020	726	2%	332	1%	1,702	3%
2030	738	3%	336	2%	1,742	5%
2040	754	6%	343	5%	1,785	8%
2050	772	8%	351	7%	1,829	10%
2060	783	10%	355	8%	1,858	12%

The same evaluation was performed for a low rainfall year. Table 22 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 100 percent capture of stormwater in the capture area of the Desoto Mine. The maximum influence was predicted to occur between 2030. However, as in the average rainfall scenarios, based on projected land use changes within the subwatershed and upstream subwatersheds, flows are predicted to increase during the Desoto mining period. Annual average flow increases by approximately 4 percent during the period of 2030, dry season flow increases by approximately 2 percent, and wet season flow increases by approximately 5 percent from 2009 levels. Flows are predicted to increase from 2009 levels by approximately 10 percent by 2060.

TABLE 22

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 100 Percent Capture at the Peace River at Arcadia Flow Station with the Desoto Mine

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	330	0%	152	0%	766	0%
2020	337	2%	154	1%	787	3%
2030	342	4%	156	2%	806	5%
2040	350	6%	159	5%	827	8%
2050	358	9%	163	7%	848	11%
2060	363	10%	165	9%	862	13%

Table 23 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 50 percent capture of stormwater in the capture area of the Desoto Mine. The maximum influence was predicted to occur between 2030. However, similar to the average rainfall year scenario, based on land use changes within the subwatershed and upstream subwatersheds, flow was predicted to increase during the Desoto mining period. Annual average flow increases by approximately 4 percent during the period of 2030, dry season flow increases by approximately 2 percent, and wet season flow increases by approximately 5 percent from 2009 levels. Flows are predicted to increase from 2009 levels by approximately 10 percent by 2060. Because of the small percentage of land that is being mined compared to the total drainage area of this gage station, the changes in land use are predicted to have more of an effect on flow than the Desoto Mine capture, and flows are projected to be about the same as in the 100 percent capture case.

TABLE 23

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 50 Percent Capture at the Peace River at Arcadia Flow Station with the Desoto Mine

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	330	0%	152	0%	766	0%
2020	337	2%	154	1%	787	3%
2030	342	4%	156	3%	806	5%
2040	350	6%	159	5%	827	8%
2050	358	9%	163	7%	848	11%
2060	363	10%	165	9%	862	13%

To illustrate the effect on Peace River at Arcadia stream flow under the conditions and scenarios evaluated, the results are presented graphically and compared to the No Action Alternative conditions. Figures 34 and 35 present the seasonal and annual average flows calculated for the Peace River at Arcadia gage station with and without the Desoto Mine based on 100 percent capture and 50 percent capture of stormwater, respectively, during average rainfall conditions. One standard deviation above and below the historical mean flow is presented to illustrate the historical range in annual stream flow. The lines essentially overlap at this scale because of the small differences.

FIGURE 34

Peace River at Arcadia Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without Desoto Mine

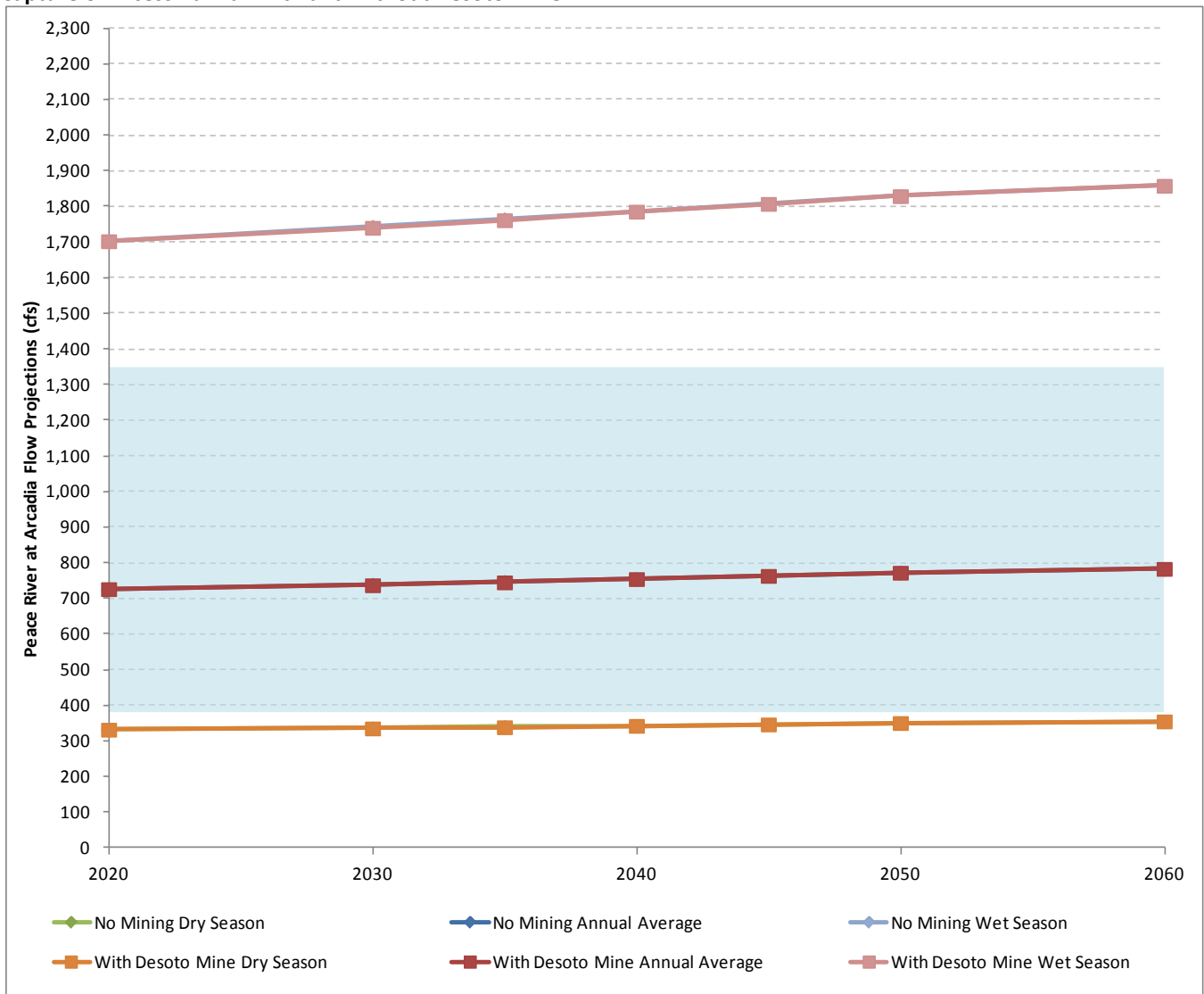
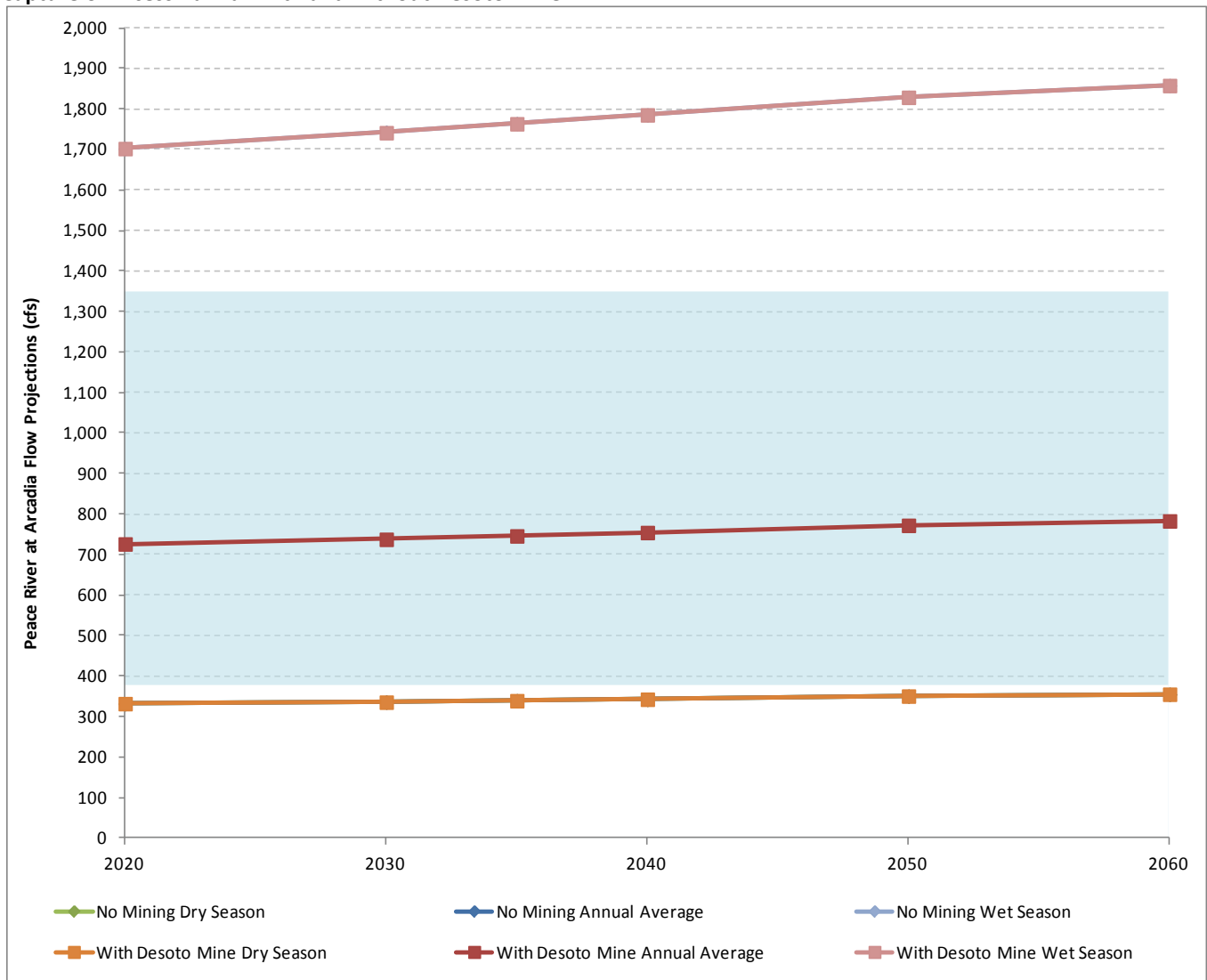


FIGURE 35

Peace River at Arcadia Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without Desoto Mine

The largest influence on annual average flow from the Peace River at Arcadia subwatershed during average rainfall conditions is predicted to occur between 2030. Based on 100 percent capture of stormwater, the Peace River at Arcadia gage station may have an average annual flow of approximately 738 cfs without the Desoto Mine (i.e., the No Action Alternative) and approximately 737 cfs with the Desoto Mine. Assuming a 50 percent capture of stormwater, Peace River at Arcadia may have an average annual flow of approximately 738 cfs for the No Action Alternative, essentially identical to the 100 percent capture case. This corresponds to a decrease in flow of less than 1 cfs when compared to the No Action Alternative results (which is why Figure 35 looks like there is a line missing, because they overlap).

Figures 36 and 37 present the seasonal and annual average flows calculated for the Peace River at Arcadia gage station with and without the Desoto Mine based on 100 percent capture and 50 percent capture of stormwater, respectively, during low rainfall conditions. Notice that at this gage, the predicted average annual low rainfall year is just below the lower range of one standard deviation.

FIGURE 36

Peace River at Arcadia Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without Desoto Mine

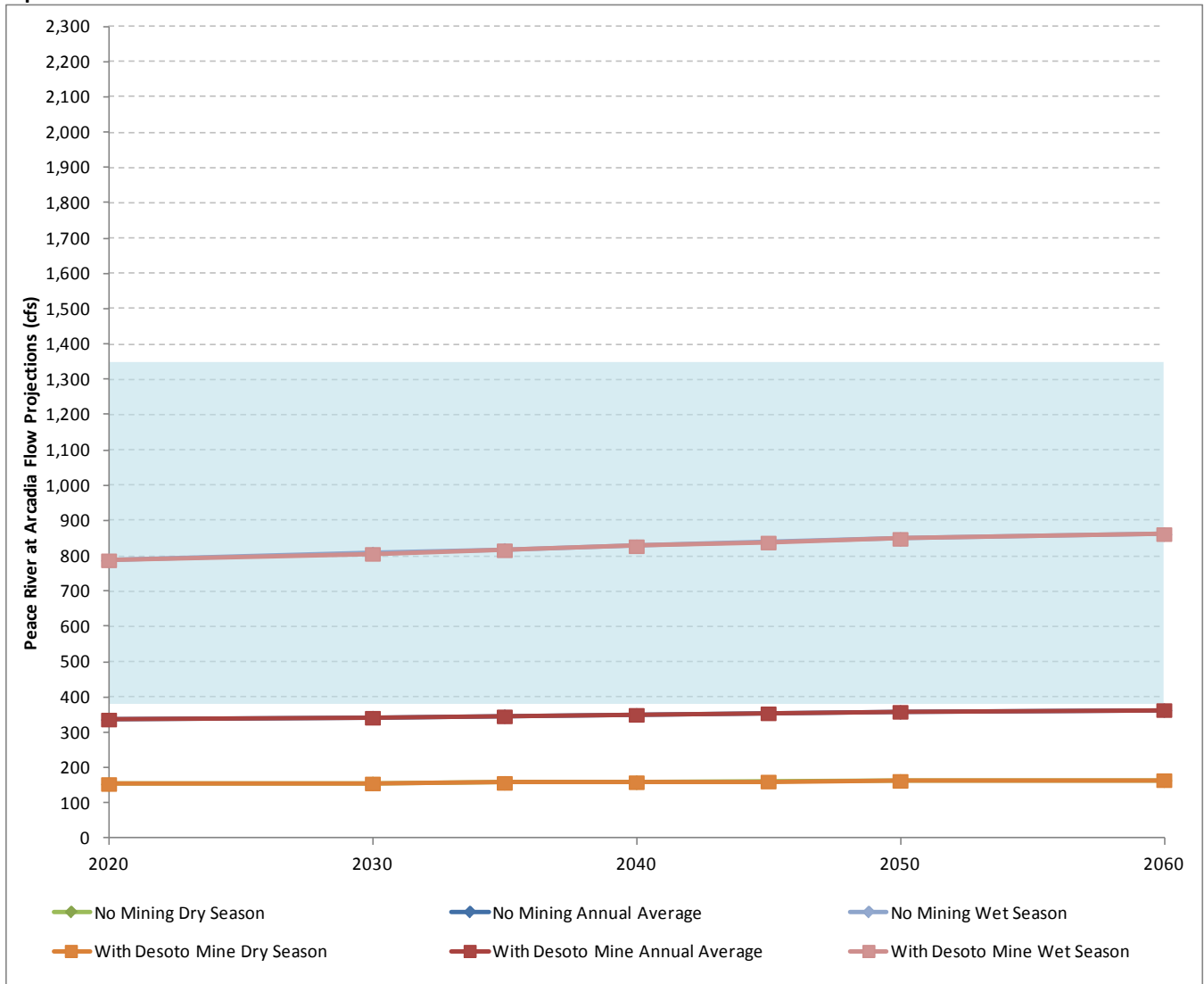
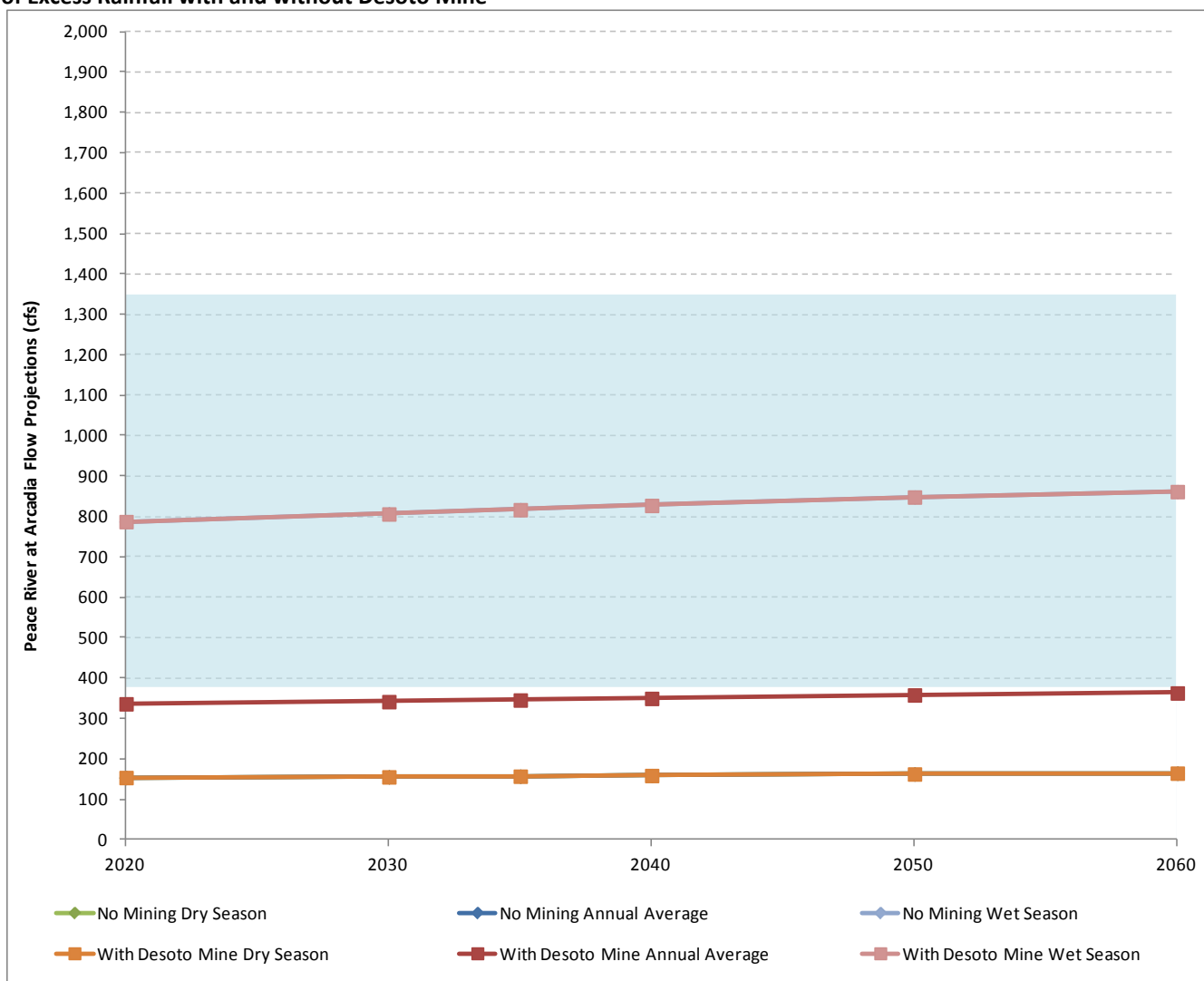


FIGURE 37

Peace River at Arcadia Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without Desoto Mine



Similar to average rainfall conditions, the largest influence on annual average flow from the Peace River at Arcadia subwatershed during low rainfall conditions was predicted to occur between 2030. Based on 100 percent capture of stormwater, Peace River at Arcadia may have an average annual flow of approximately 342 cfs without the Desoto Mine (No Action Alternative) and approximately the same flow with the Desoto Mine. Assuming a 50 percent capture of stormwater, Peace River at Arcadia would have about the same flow as the 100 percent capture case. This corresponds to a decrease in flow of less than 1 cfs when compared to the No Action Alternative conditions.

The Desoto Mine would account for a small relative contribution to the flows measured at the Peace River at Arcadia gage station. The Desoto Mine impact on flow quantities at this station would likely not be perceivable, particularly since flows would be expected to increase because of land use changes in the Peace River at Arcadia drainage area.

5.3 Ona Mine Impacts on Runoff Characteristics and Stream Flow

The effects of the Ona Mine were calculated by evaluating the change to the runoff coefficients in the Horse Creek and Peace River at Arcadia subwatersheds with this mine's capture area effects accounted for over the life cycle of the mine. Projections were performed for an average rainfall year and for a low rainfall year with 100 and

50 percent stormwater capture, as was done for the Desoto Mine. The capture curves indicate that the most area under surface water management controls at this alternative is around 2045 for the Horse Creek subwatershed, and around 2045 for the Peace River at Arcadia subwatershed. Therefore, an extra analysis was conducted for 2045 to evaluate the near peak capture conditions.

5.3.1 Ona Mine Impacts on Horse Creek

Table 24 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 100 percent capture of stormwater in the capture area of the Ona Mine at the Horse Creek flow station near Arcadia. The maximum influence was predicted to occur around 2045, when annual average flow decreases by approximately 6 percent, dry season flow decreases by approximately 7 percent, and wet season flow decreases by approximately 4 percent from 2009 levels. However, because of changes in land use within this watershed, flows are predicted to increase from 2009 levels by 2060.

TABLE 24

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 100 Percent Capture at the Horse Creek Flow Station with the Ona Mine

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	171	0%	78	0%	404	0%
2020	172	1%	78	0%	413	2%
2030	166	-3%	74	-4%	398	-2%
2040	162	-5%	73	-6%	391	-3%
2045	161	-6%	72	-7%	387	-4%
2050	164	-4%	74	-5%	395	-2%
2060	175	2%	79	1%	420	4%

Table 25 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 50 percent capture of stormwater in the capture area of the Ona Mine at the Horse Creek flow station. The maximum influence was predicted to occur between 2040 and 2045, when annual average flow decreases by approximately 1 percent, dry season flow decreases by approximately 2 to 3 percent, and wet season flow is approximately the same as 2009 levels. However, when considering only the Ona Mine and changes in land use within this watershed, annual average flows are predicted to increase by approximately 3 percent when compared to 2009 flows, with a 2 percent increase in dry season flows and a 4 percent increase in wet weather flows by 2060.

TABLE 25

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 50 Percent Capture at the Horse Creek Flow Station with the Ona Mine

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	171	0%	78	0%	404	0%
2020	172	1%	78	0%	413	2%
2030	169	-1%	76	-2%	407	1%
2040	168	-1%	76	-3%	405	0%
2045	168	-1%	76	-2%	405	0%
2050	170	-1%	76	-2%	408	1%
2060	176	3%	79	2%	422	4%

The same evaluation was performed for a low rainfall year. For the Ona Mine analysis, this calculation used 43 inches of rainfall per year. Table 26 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 100 percent capture of stormwater in the capture area of the Ona Mine at the Horse Creek flow station. The maximum influence was predicted to occur 2045, when annual average flow decreases by approximately 6 percent, dry season flow decreases by approximately 7 percent, and wet season flow decreases by approximately 4 percent from 2009 levels. However, because of changes in land use within this watershed, flows are predicted to increase from 2009 levels by 2060.

TABLE 26

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 100 Percent Capture at the Horse Creek Flow Station with the Ona Mine

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	84	0%	38	0%	199	0%
2020	85	1%	38	0%	203	2%
2030	81	-3%	37	-4%	195	-2%
2040	80	-5%	36	-6%	192	-3%
2045	79	-6%	36	-7%	190	-4%
2050	81	-4%	36	-5%	194	-2%
2060	86	2%	39	1%	207	4%

Table 27 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 50 percent capture of stormwater in the capture area of the Ona Mine at the Horse Creek flow station. The maximum influence was predicted to occur in 2040, when annual average flow decreases by approximately 1 percent, dry season flow decreases by approximately 3 percent, and wet season flow is approximately the same as 2009 levels. However, when considering only the Ona Mine, because of changes in land use within this watershed, annual average flows are predicted to increase by approximately 3 percent when compared to 2009 flows with a 2 percent decrease in dry season flows and a 4 percent increase in wet season flows by 2060.

TABLE 27

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 50 Percent Capture at the Horse Creek Flow Station with the Ona Mine

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	84	0%	38	0%	199	0%
2020	85	1%	38	0%	203	2%
2030	83	-1%	37	-2%	200	1%
2040	83	-1%	37	-3%	199	0%
2045	83	-1%	37	-2%	199	0%
2050	83	-1%	37	-2%	201	1%
2060	86	3%	39	2%	208	4%

To illustrate the effect on Horse Creek stream flow under the conditions and scenarios evaluated, the results are presented graphically and compared to the No Action Alternative conditions. Figures 38 and 39 present the seasonal and annual average flows calculated for the Horse Creek gage station with and without the Ona Mine based on 100 percent capture and 50 percent capture of stormwater, respectively, during average rainfall conditions. One standard deviation above and below the historical mean flow is presented to illustrate the historical range in annual stream flow.

The largest influence on annual average flow from the Horse Creek subwatershed during average rainfall conditions was predicted to occur between 2040 and 2045. Based on 100 percent capture of stormwater, Horse Creek may have an average annual flow of approximately 174 cfs without the Ona Mine (No Action Alternative), and approximately 161 cfs with the Ona Mine around 2045. Assuming a 50 percent capture of stormwater, Horse Creek may have an average annual flow of approximately 166 cfs around 2040. This corresponds to a decrease in flow of 8 cfs when compared to the No Action Alternative conditions.

Figures 40 and 41 present the seasonal and annual average flows calculated for the Horse Creek gage station with and without the Ona Mine based on 100 percent capture and 50 percent capture of stormwater, respectively, during low rainfall conditions.

Similar to average rainfall conditions, the largest influence on annual average flow from the Horse Creek subwatershed during low rainfall conditions was predicted to occur around 2040 and 2045. Based on 100 percent capture of stormwater, Horse Creek may have an average annual flow of approximately 86 cfs without the Ona Mine (No Action Alternative) and approximately 79 cfs with the Ona Mine around 2045. Assuming a 50 percent capture of stormwater, Horse Creek may have an average annual flow of approximately 83 cfs around 2040. This corresponds to a decrease in flow of 3 cfs when compared to the No Action Alternative conditions.

FIGURE 38

Horse Creek Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without Ona Mine

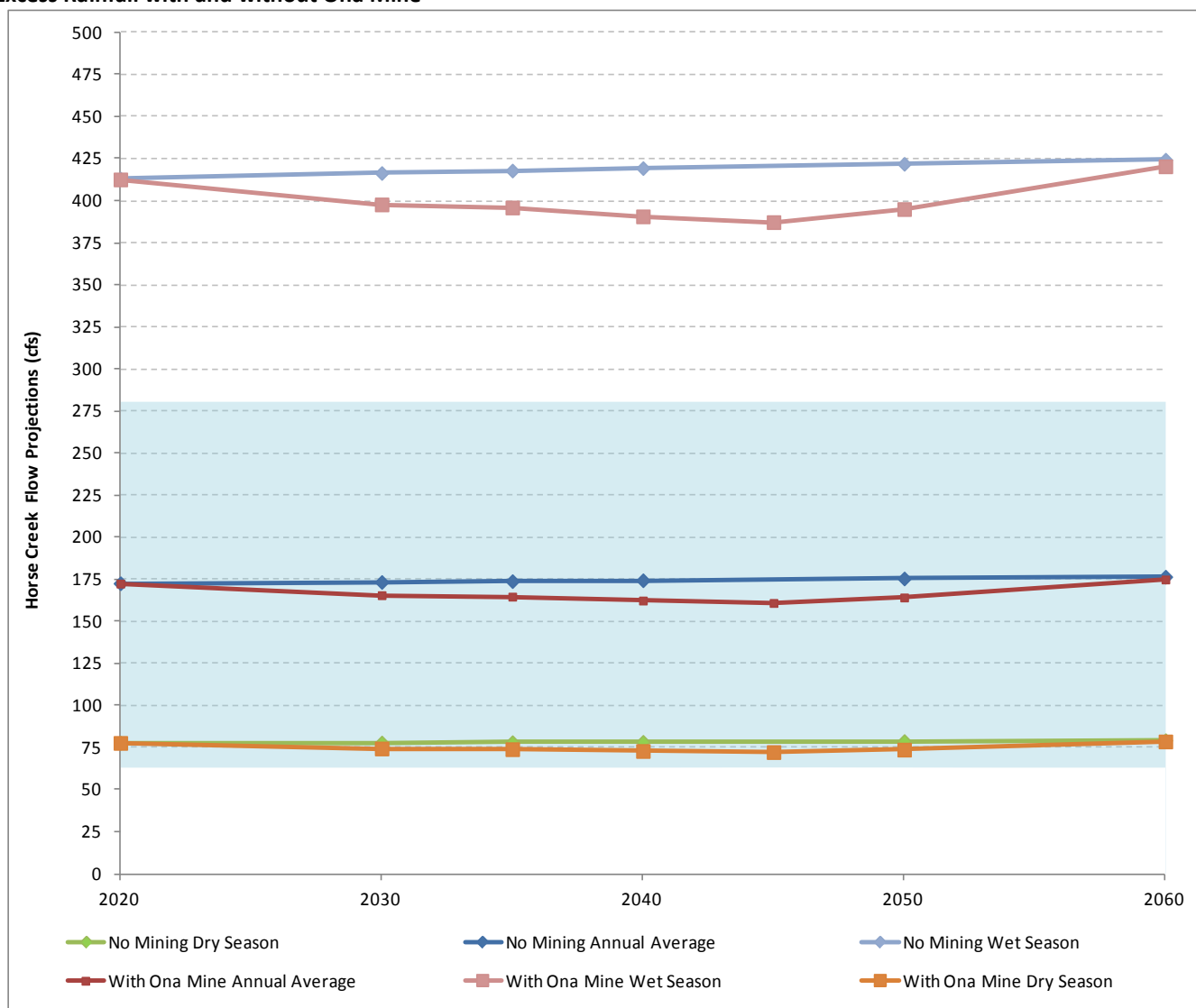


FIGURE 39

Horse Creek Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without Ona Mine

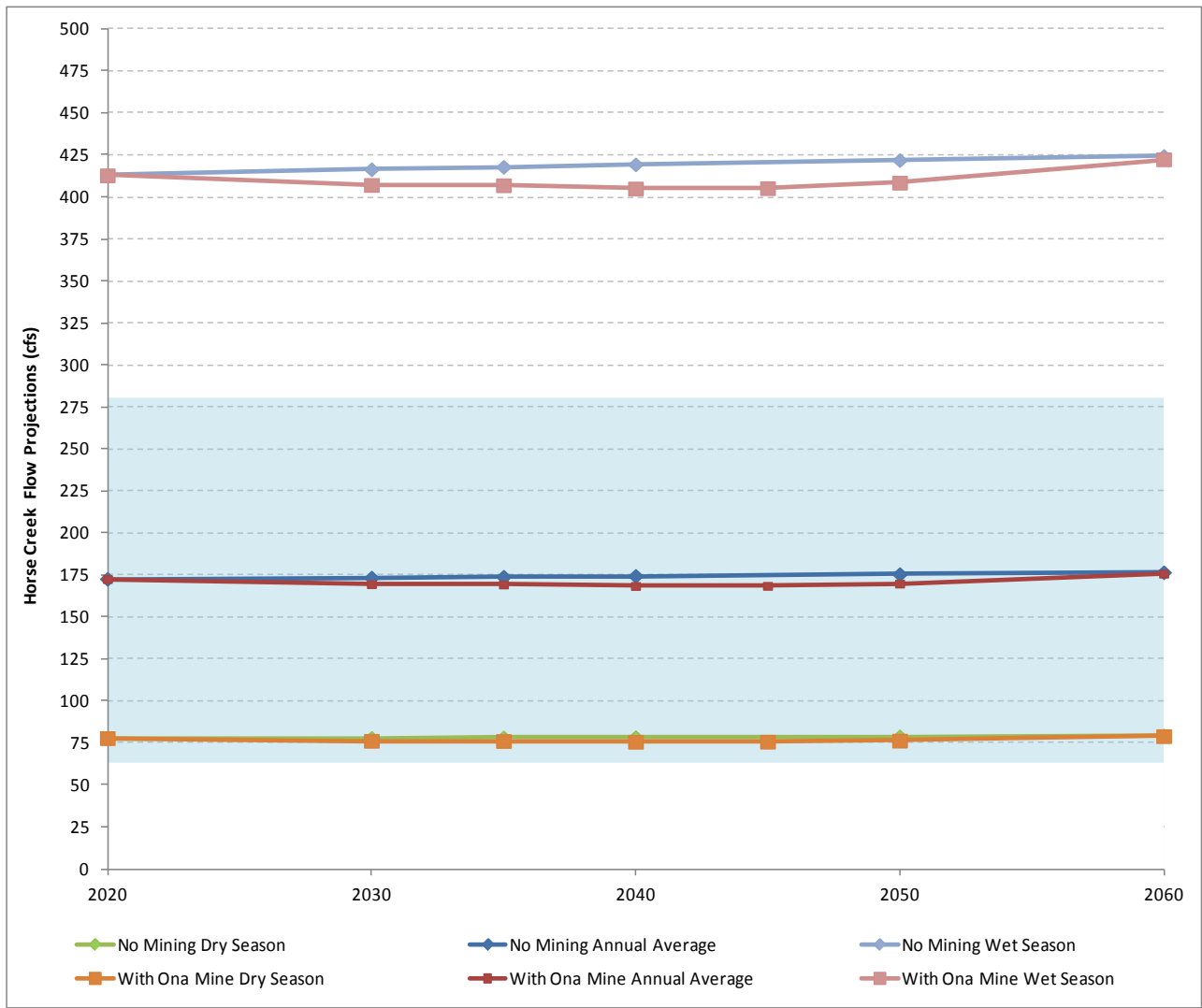


FIGURE 40

Horse Creek Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without Ona Mine

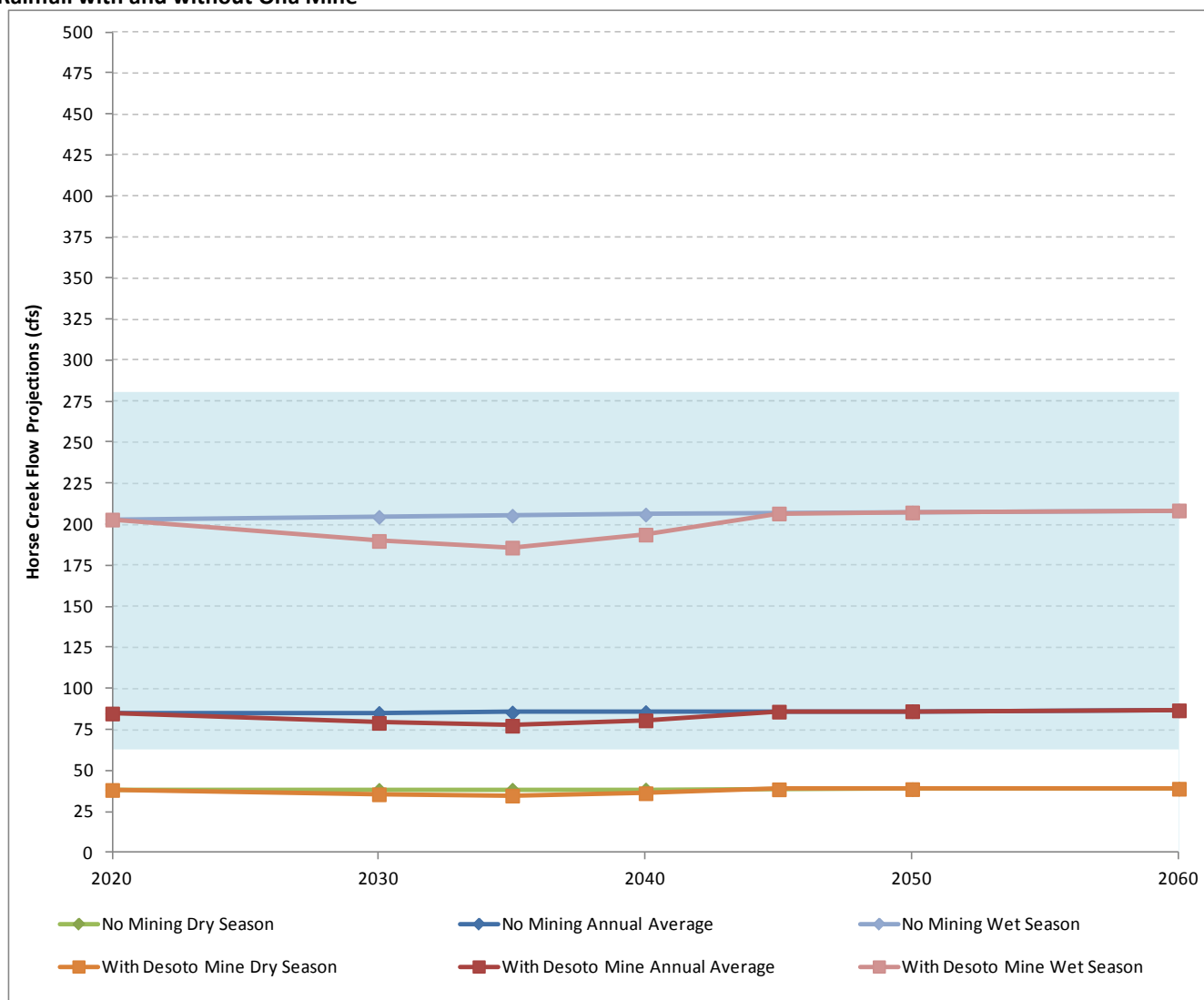


FIGURE 41

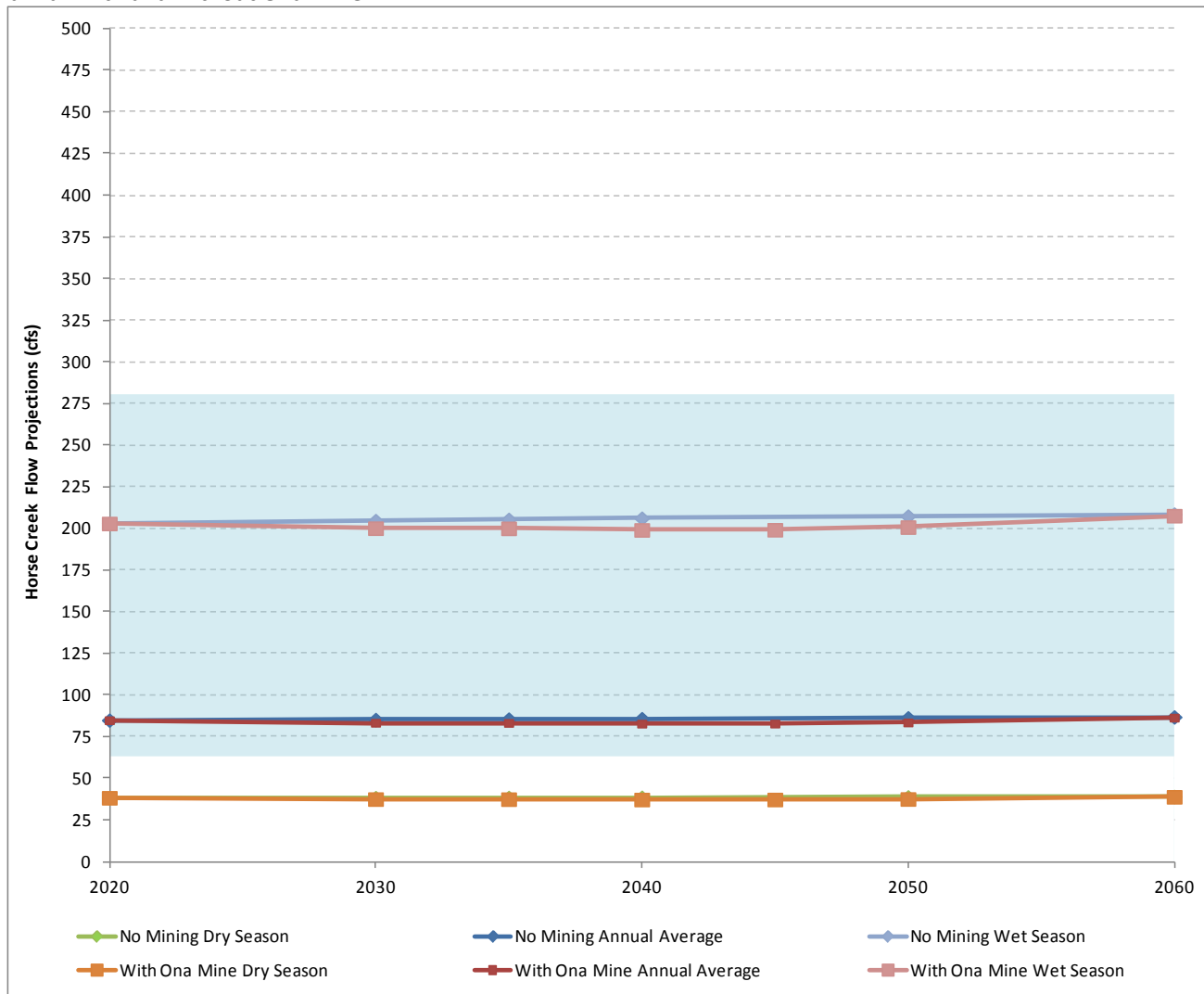
Horse Creek Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without Ona Mine**5.3.2 Ona Mine Impacts on Peace River at Arcadia**

Table 28 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 100 percent capture of stormwater in the capture area of the Ona Mine at the Peace River at Arcadia flow station. The maximum influence was predicted to occur between 2040 based on the capture curve. Like Desoto, the amount of area impacted in this subwatershed is relatively small. Based on land use changes within the subwatershed and upstream subwatersheds, annual flow is predicted to increase during the Ona mining period. Annual average flow increases by approximately 5 to 8 percent during the period of 2040 and 2050, dry season flow increases by approximately 4 to 6 percent, and wet season flow increases by approximately 7 to 10 percent from 2009 levels. Flows are predicted to increase from 2009 levels by approximately 10 percent by 2060. Because of the small percentage of land that would be mined compared to the total drainage area of this gage station, the changes in land use are predicted to have more of an effect on flow than the Ona Mine capture.

TABLE 28

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 100 Percent Capture at the Peace River at Arcadia Flow Station with the Ona Mine

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	713	0%	328	0%	1,657	0%
2020	726	2%	332	1%	1,701	3%
2030	736	3%	335	2%	1,741	5%
2040	750	5%	340	4%	1,780	7%
2050	769	8%	349	6%	1,825	10%
2060	782	10%	354	8%	1,858	12%

Table 29 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 50 percent capture of stormwater in the capture area of the Ona Mine at the Peace River at Arcadia gage station. The maximum influence was predicted to occur between 2040 and 2050 based on the capture analysis. However, similar to the 100 percent capture case, based on land use changes within the subwatershed and upstream subwatersheds, flows are predicted to increase during the Ona mining period. Annual average flow increases by approximately 6 to 8 percent during the period of 2040 and 2050, dry season flow increases by approximately 4 to 7 percent, and wet season flow increases by approximately 8 to 10 percent from 2009 levels. Flows are predicted to increase from 2009 levels by approximately 10 percent by 2060. Again, the small percentage of land that would be mined compared to the total drainage area of this gage station causes the land use to have more of an effect on flow than the Ona Mine capture, and flows are projected to be the about same as in the 100 percent capture case.

TABLE 29

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 50 Percent Capture at the Peace River at Arcadia Flow Station with the Ona Mine

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	713	0%	328	0%	1,657	0%
2020	726	2%	332	1%	1,702	3%
2030	738	4%	336	2%	1,742	5%
2040	753	6%	342	4%	1,783	8%
2050	771	8%	350	7%	1,827	10%
2060	783	10%	355	8%	1,858	12%

The same evaluation was performed for a low rainfall year. Low rainfall conditions were estimated as the 20th percentile of the annual rainfall totals for the period of record (i.e., 80 percent of the years had higher rainfall). Table 30 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 100 percent capture of stormwater in the capture area of the Ona Mine. The maximum influence is predicted to occur between 2040 and 2050 based on the capture analysis. However, identical to the average rainfall scenarios, based on projected land use changes within the subwatershed and upstream subwatersheds, annual flow is predicted to increase during the Ona mining period. Annual average flow increases by approximately 5 to 8 percent during the period of 2040 and 2050, dry season flow increases by approximately

4 to 7 percent, and wet season flow increases by approximately 8 to 11 percent from 2009 levels. Flows are predicted to increase from 2009 levels by approximately 10 percent by 2060. The changes in projected land use are predicted to have more of an effect on flow than the Ona Mine capture.

TABLE 30

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 100 Percent Capture at the Peace River at Arcadia Flow Station with the Ona Mine

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	330	0%	152	0%	766	0%
2020	336	2%	154	1%	787	3%
2030	341	3%	155	2%	806	5%
2040	348	5%	158	4%	825	8%
2050	357	8%	162	7%	847	11%
2060	363	10%	164	8%	862	13%

Table 31 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 50 percent capture of stormwater in the capture area of the Ona Mine. The maximum influence was predicted to occur between 2040 and 2050 based on the capture analysis. However, similar to the average rainfall year scenario, based on land use changes within the subwatershed and upstream subwatersheds, annual flow is predicted to increase during the Ona mining period. Annual average flow increases by approximately 6 to 9 percent during the period of 2040 and 2050, dry season flow increases by approximately 5 to 7 percent, and wet season flow increases by approximately 8 to 11 percent from 2009 levels. Flows are predicted to increase from 2009 levels by approximately 10 percent by 2060. Again, the changes in projected land use are predicted to have more of an effect on flow than the Ona Mine capture, and flows are projected to be the about same as in the 100 percent capture case.

TABLE 31

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 50 Percent Capture at the Peace River at Arcadia Flow Station with the Ona Mine

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	330	0%	152	0%	766	0%
2020	336	2%	154	1%	787	3%
2030	342	4%	156	3%	807	5%
2040	349	6%	159	5%	826	8%
2050	358	9%	163	7%	848	11%
2060	363	10%	165	9%	862	13%

To illustrate the effect on Peace River at Arcadia stream flow under the conditions and scenarios evaluated, the results are presented graphically and compared to the No Action Alternative conditions. Figures 42 and 43 present the seasonal and annual average flows calculated for the Peace River at Arcadia gage station with and without the Ona Mine based on 100 percent capture and 50 percent capture of stormwater, respectively, during average rainfall conditions.

FIGURE 42

Peace River at Arcadia Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without Ona Mine

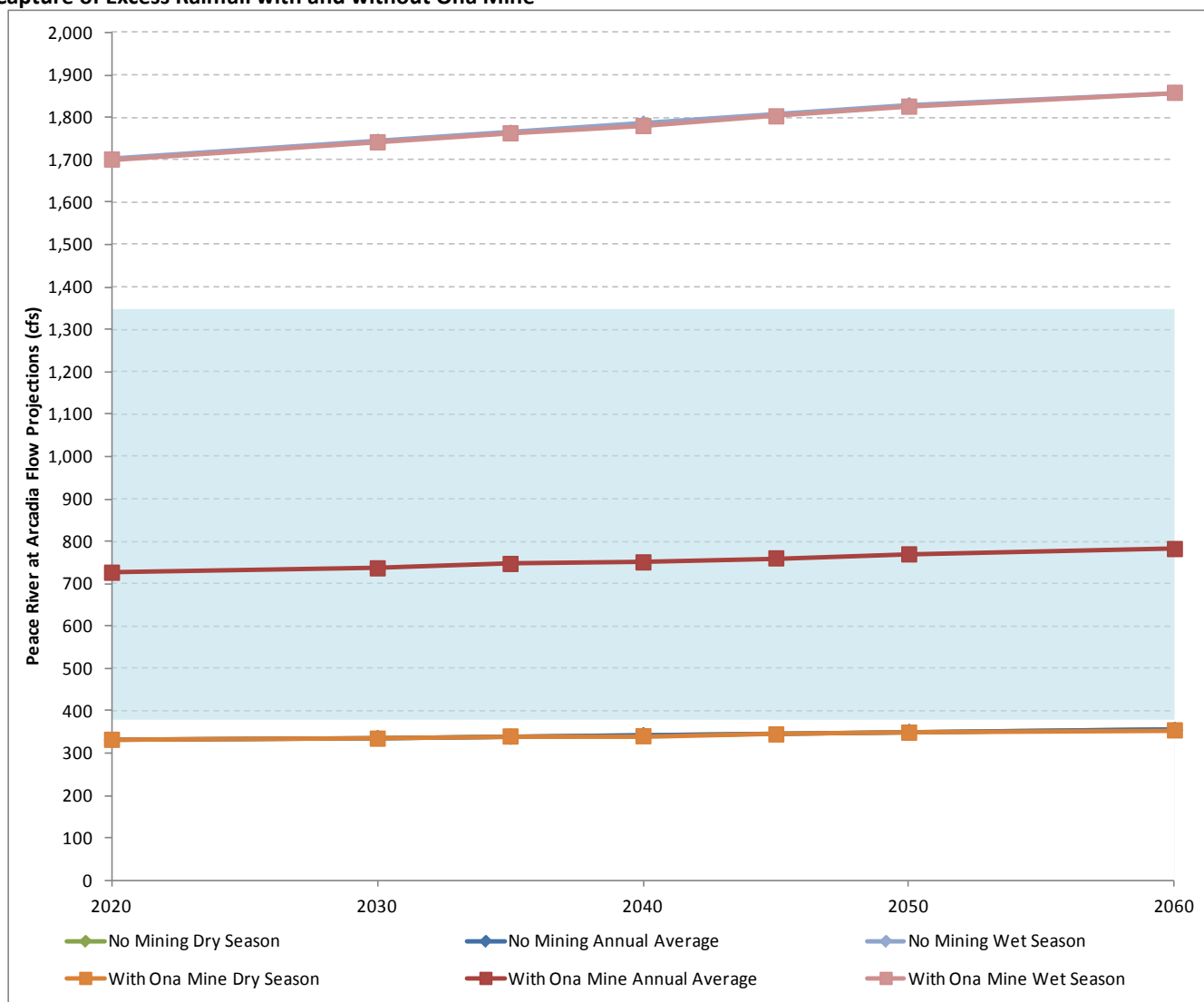
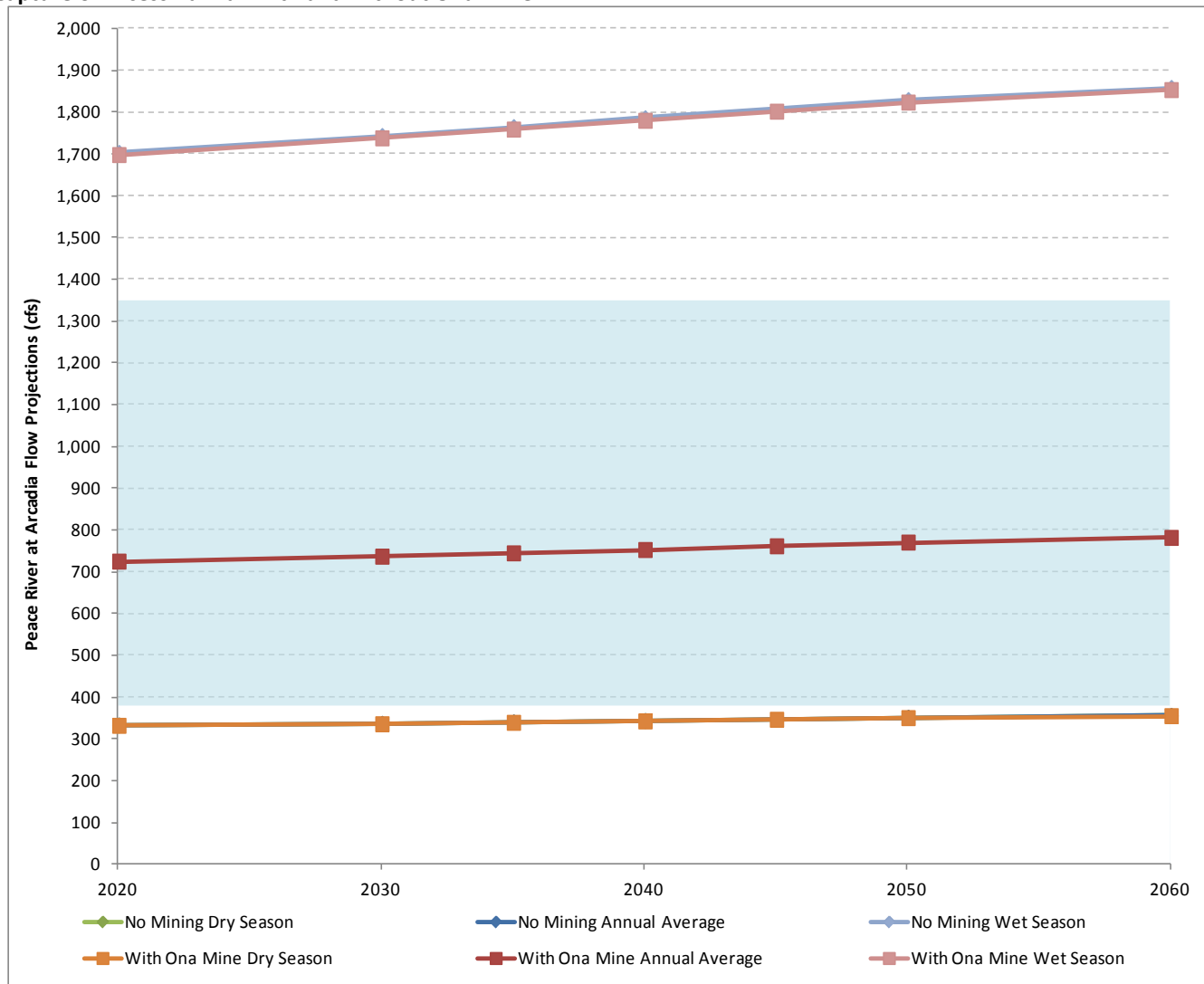


FIGURE 43

Peace River at Arcadia Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without Ona Mine

The largest influence on annual average flow from the Peace River at Arcadia subwatershed during average rainfall conditions is predicted to occur between 2040 and 2050 based on the capture analysis. Based on 100 percent capture of stormwater, Peace River at Arcadia may have an average annual flow of approximately 754 to 772 cfs without the Ona Mine (No Action Alternative) and approximately 750 to 769 cfs with the Ona Mine during that period. Assuming a 50 percent capture of stormwater, Peace River at Arcadia may have an average annual flow of approximately 752 to 770 cfs. This corresponds to a decrease in flow of about 2 cfs when compared to the No Action Alternative conditions (again, overlapping curves).

Figures 44 and 45 present the seasonal and annual average flows calculated for the Peace River at Arcadia gage station with and without the Ona Mine based on 100 percent capture and 50 percent capture of stormwater, respectively, during low rainfall conditions.

FIGURE 44

Peace River at Arcadia Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without Ona Mine

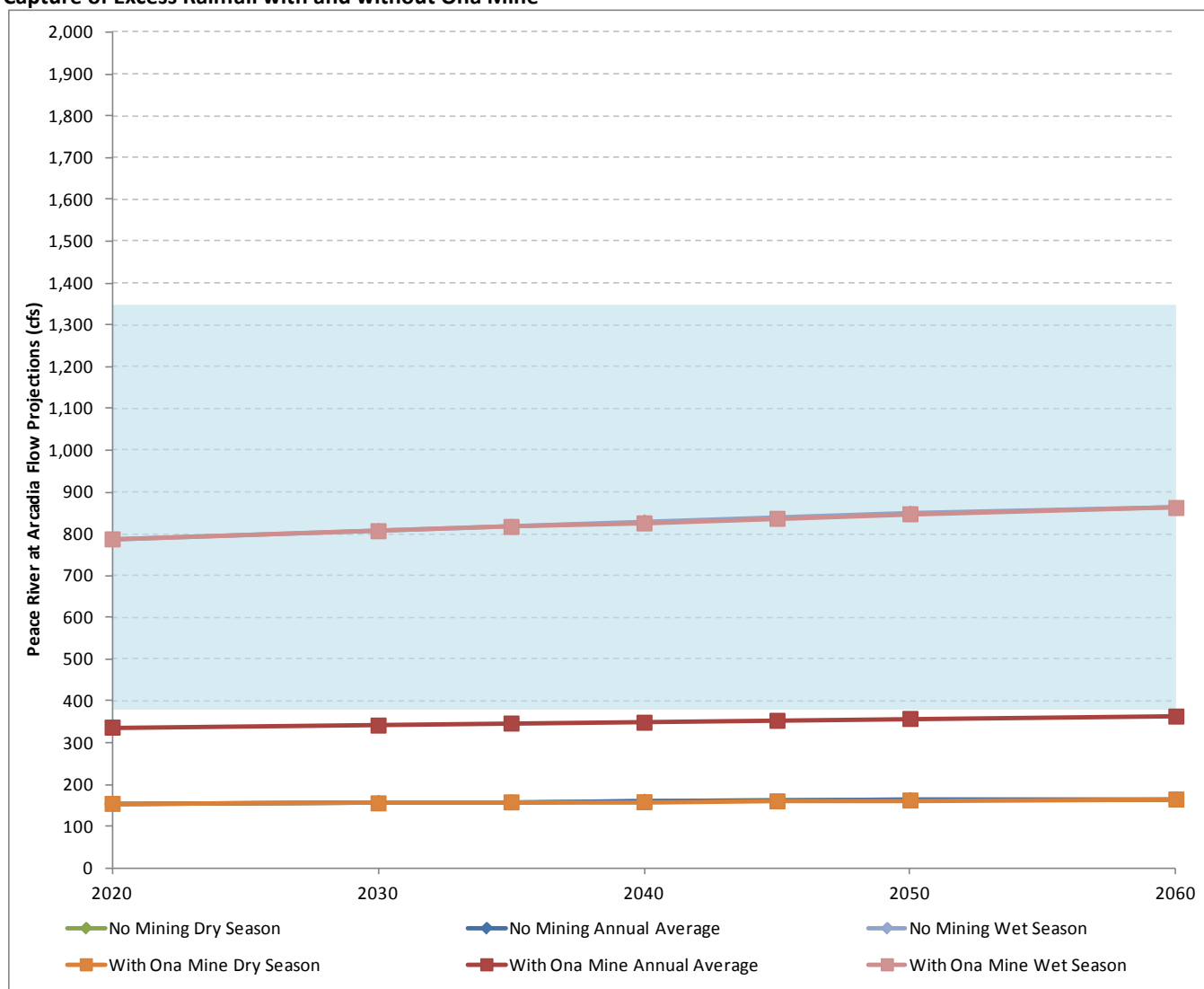
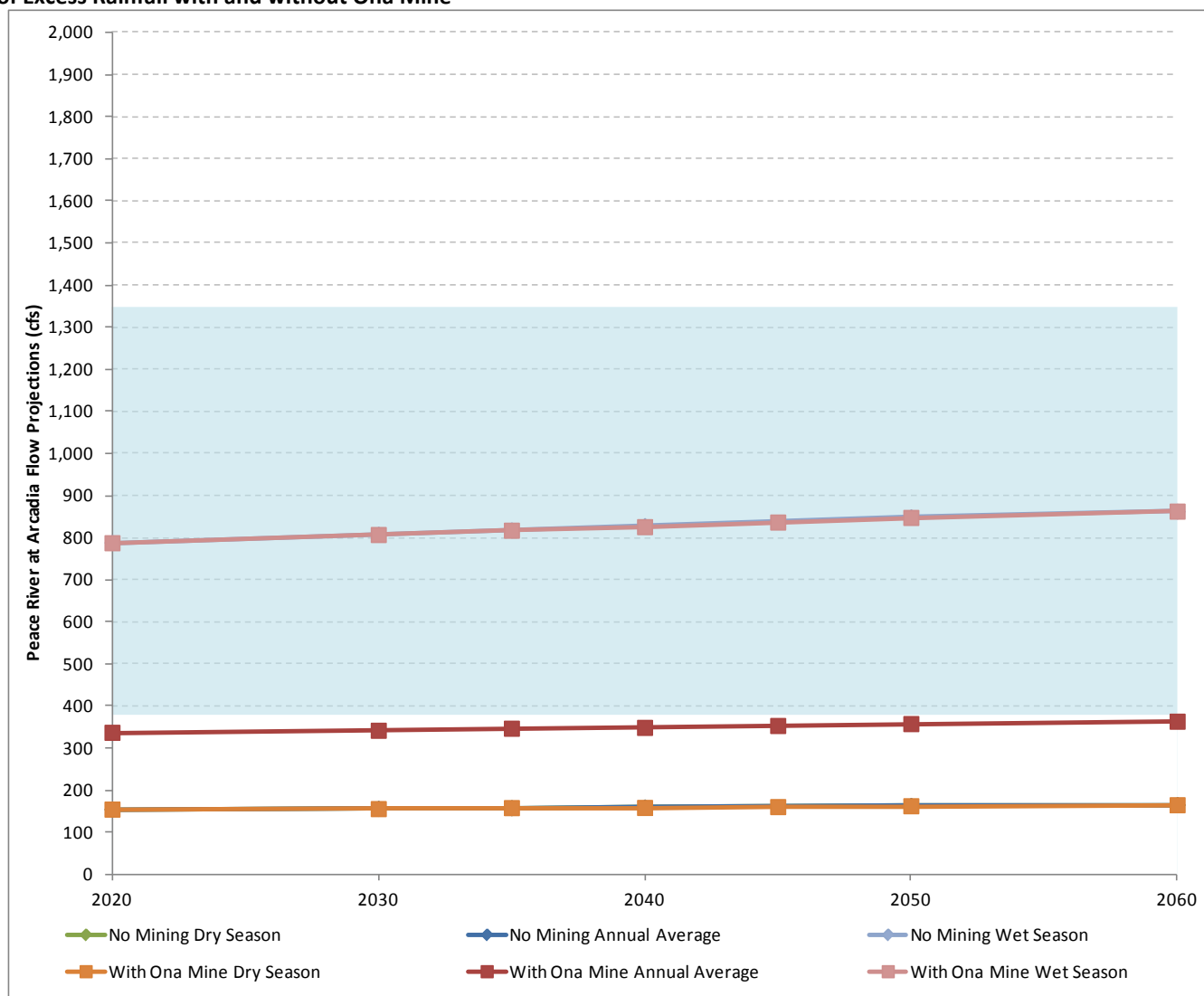


FIGURE 45

Peace River at Arcadia Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without Ona Mine



Similar to average rainfall conditions, the largest influence on annual average flow from the Horse Creek subwatershed during low rainfall conditions was predicted to occur between 2040 and 2050 based on the capture analysis. Based on 100 percent capture of stormwater, Horse Creek may have an average annual flow of approximately 350 to 358 cfs without the Ona Mine (No Action Alternative) and approximately 348 to 357 cfs with the Ona Mine during that period. Assuming a 50 percent capture of stormwater, Horse Creek may have an average annual flow of approximately 349 to 358 cfs, almost identical to the 100 percent capture case. This corresponds to a decrease in flow of 1 to 2 cfs when compared to the No Action Alternative conditions.

The Ona Mine area would comprise a small relative contribution to the flows measured at the Peace River at Arcadia gage station. Ona Mine effect on flow quantities at this station would likely not be perceivable, particularly since flows would be expected to increase because of projected land use changes in the Peace River at Arcadia drainage area.

5.4 Wingate East Mine Impacts on Runoff Characteristics and Stream Flow

The capture curve indicates that the most area under surface water management controls for this alternative is relatively similar between 2030 and 2050 for the Upper Myakka River subwatershed. Table 32 presents the flow

and percent change from 2009 average annual and seasonal flows during an average rainfall year with 100 percent capture of stormwater in the capture area of the Wingate East Mine at the upper Myakka River gage station. The maximum influence was predicted to occur between 2030 and 2050 according to the capture analysis. However, based on projected land use changes within the subwatershed and upstream subwatersheds, flows are predicted to increase during the Wingate mining period. Annual average flow increases by approximately 6 to 11 percent during the period of 2030 and 2050, dry season flow increases by approximately 6 to 12 percent, and wet season flow increases by approximately 5 to 11 percent from 2009 levels. Flows are predicted to increase from 2009 levels by approximately 15 percent by 2060. Because the small percentage of land that would be mined compared to the total drainage area of this gage station, and the fact that approximately 60 percent of the Wingate East Mine would be wet dredged and there would be less storage available to capture stormwater, the changes in land use are predicted to have more of an effect on flow than the Wingate East Mine capture.

TABLE 32

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 100 Percent Capture at the Upper Myakka Flow Station with the Wingate East Mine

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	243	0%	109	0%	589	0%
2020	251	3%	113	3%	607	3%
2030	257	6%	115	6%	620	5%
2040	264	8%	118	9%	635	8%
2050	271	11%	122	12%	652	11%
2060	279	15%	125	15%	671	14%

Table 33 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 50 percent capture of stormwater in the capture area of the Wingate East Mine at the upper Myakka River gage station. The maximum influence was predicted to occur between 2030 and 2050 based on the capture analysis. However, similar to the 100 percent capture case, based on land use changes within the subwatershed and upstream subwatersheds, flows are predicted to increase during the Wingate East mining period. Annual average flow increases by approximately 6 to 12 percent during the period of 2030 and 2050, dry season flow increases by approximately 6 to 12 percent, and wet season flow increases by approximately 6 to 11 percent from 2009 levels. Flows are predicted to increase from 2009 levels by approximately 15 percent by 2060.

TABLE 33

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 50 Percent Capture at the Upper Myakka River Flow Station with the Wingate East Mine

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	243	0%	109	0%	589	0%
2020	251	3%	113	3%	607	3%
2030	258	6%	116	6%	622	6%
2040	265	9%	119	9%	638	8%
2050	271	12%	122	12%	654	11%
2060	279	15%	125	15%	671	14%

The same evaluation was performed for a low rainfall year. For the Wingate East Mine analysis, this low rainfall calculation used 43 inches of rainfall per year, the same low rainfall volume as in the Peace River watershed. Table 34 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 100 percent capture of stormwater in the capture area of the Wingate East Mine. The maximum influence is predicted to occur between 2030 and 2050 based on the capture analysis. However, identical to the average rainfall scenarios, based on land use changes within the subwatershed and upstream subwatersheds, flows are predicted to increase during the Wingate mining period. Annual average flow increases by approximately 6 to 11 percent during the period of 2030 and 2050, dry season flow increases by approximately 6 to 12 percent, and wet season flow increases by approximately 5 to 11 percent from 2009 levels. Flows are predicted to increase from 2009 levels by approximately 15 percent by 2060.

TABLE 34

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 100 Percent Capture at the Upper Myakka River Flow Station with the Wingate East Mine

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	197	0%	88	0%	478	0%
2020	204	3%	91	3%	492	3%
2030	208	6%	93	6%	503	5%
2040	214	8%	96	9%	516	8%
2050	220	11%	99	12%	529	11%
2060	226	15%	102	15%	544	14%

Table 35 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 50 percent capture of stormwater in the capture area of the Wingate East Mine. The maximum influence was predicted to occur between 2030 and 2050 based on the capture analysis. However, similar to the average rainfall year scenario, based on land use changes within the subwatershed and upstream subwatersheds, flows are predicted to increase during the Wingate mining period. Annual average flow increases by approximately 6 to 12 percent during the period of 2030 and 2050, dry season flow increases by approximately 6 to 12 percent, and wet season flow increases by approximately 6 to 11 percent from 2009 levels. Flows are predicted to increase from 2009 levels by approximately 15 percent by 2060. Considering the small percentage of land that would be mined compared to the total drainage area of this gage station, and the fact that approximately half of the Wingate East Mine is planned to be dredged, the changes in land use are predicted to have more of an effect on flow than the Wingate East Mine capture, and flows are projected to be about the same as in the 100 percent capture case.

TABLE 35

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 50 Percent Capture at the Upper Myakka River Flow Station with the Wingate East Mine

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	197	0%	88	0%	478	0%
2020	204	3%	91	3%	492	3%
2030	209	6%	94	6%	505	6%
2040	215	9%	96	9%	517	8%
2050	220	12%	99	12%	530	11%
2060	226	15%	102	15%	544	14%

To illustrate the effect on upper Myakka River stream flow under the conditions and scenarios evaluated, the results are presented graphically and compared to the No Action Alternative conditions. Figures 46 and 47 present the seasonal and annual average flows calculated for the upper Myakka River gage station with and without the Wingate East Mine based on 100 percent capture and 50 percent capture of stormwater, respectively, during average rainfall conditions.

FIGURE 46

Upper Myakka River Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without Wingate East Mine

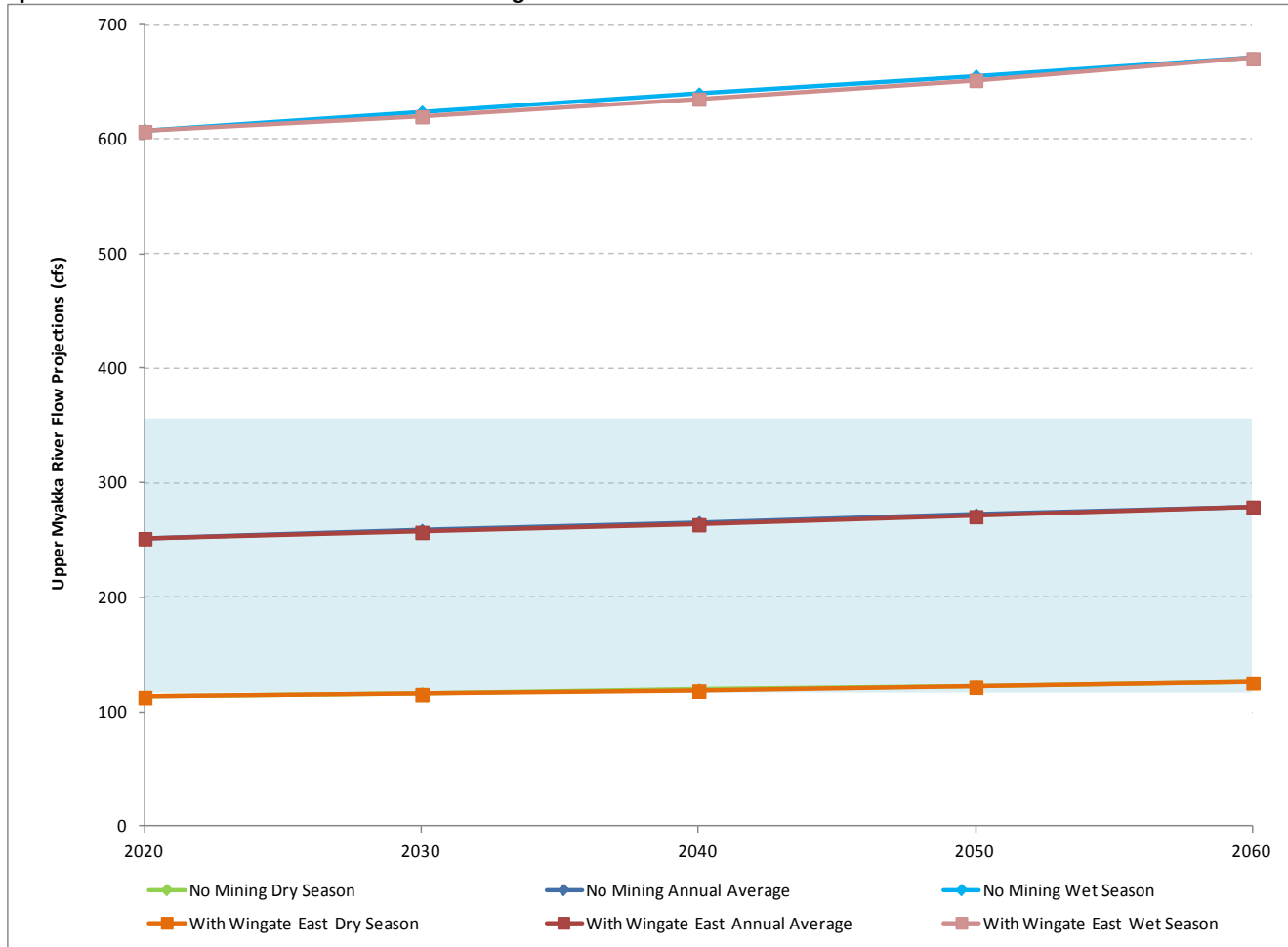
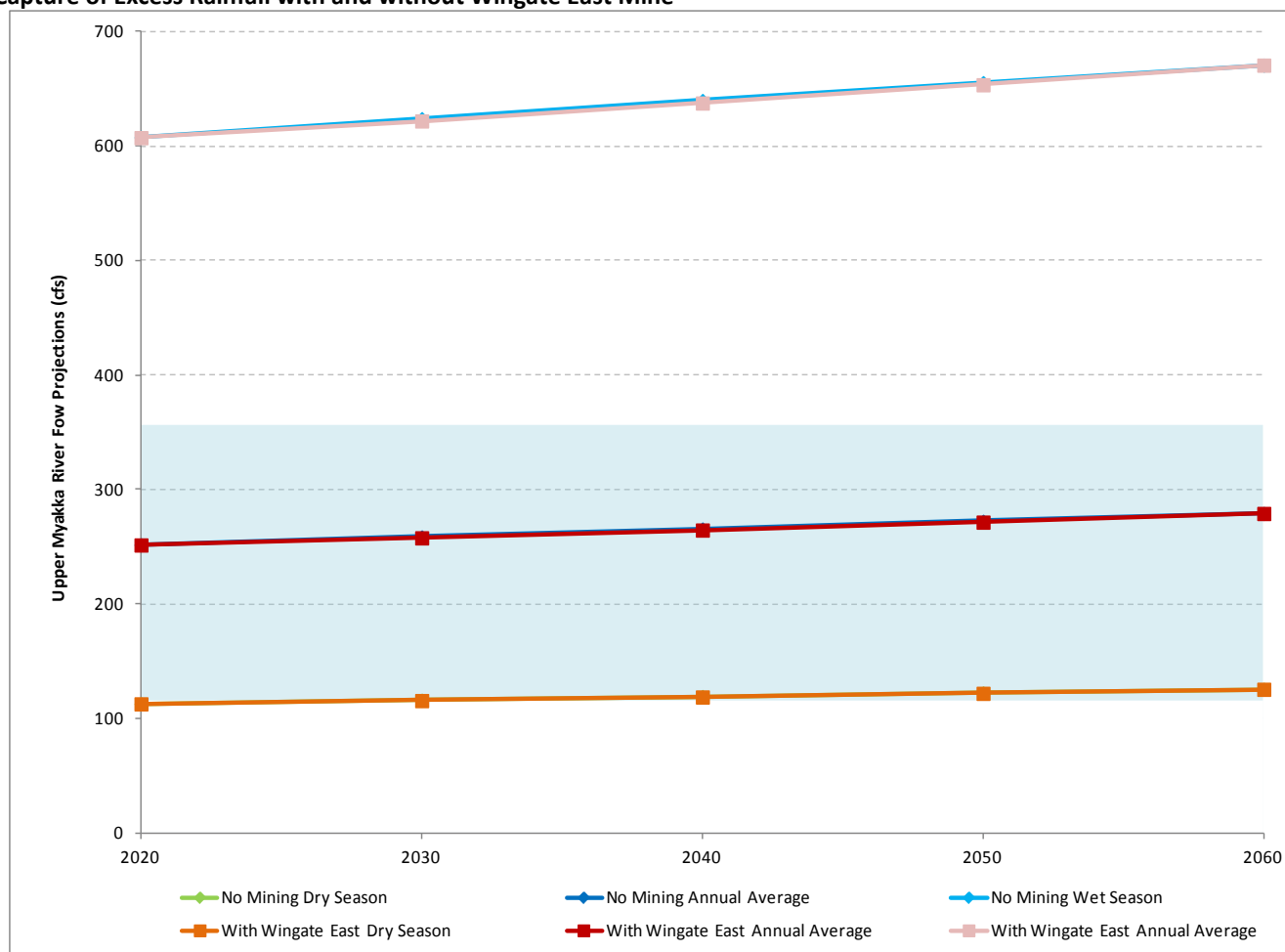


FIGURE 47

Upper Myakka River Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without Wingate East Mine



The largest influence on annual average flow from the upper Myakka River subwatershed during average rainfall conditions is predicted to occur between 2030 and 2050 based on the capture analysis. Based on 100 percent capture of stormwater, the upper Myakka River may have an average annual flow of approximately 259 to 272 cfs without the Wingate East Mine and approximately 257 to 271 cfs with the Wingate East Mine during that period. Assuming a 50 percent capture of stormwater, Peace River at Arcadia may have an average annual flow of approximately 258 to 271 cfs, almost identical to the 100 percent capture case. This corresponds to a decrease in flow of 1 to 2 cfs when compared to the No Action Alternative conditions.

Figures 48 and 49 present the seasonal and annual average flows calculated for the upper Myakka River gage station with and without the Wingate East Mine based on 100 percent capture and 50 percent capture of stormwater, respectively, during low rainfall conditions. One standard deviation above and below the historical mean flow is presented to illustrate the historical range in stream flow.

FIGURE 48

Upper Myakka River Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without Wingate East Mine

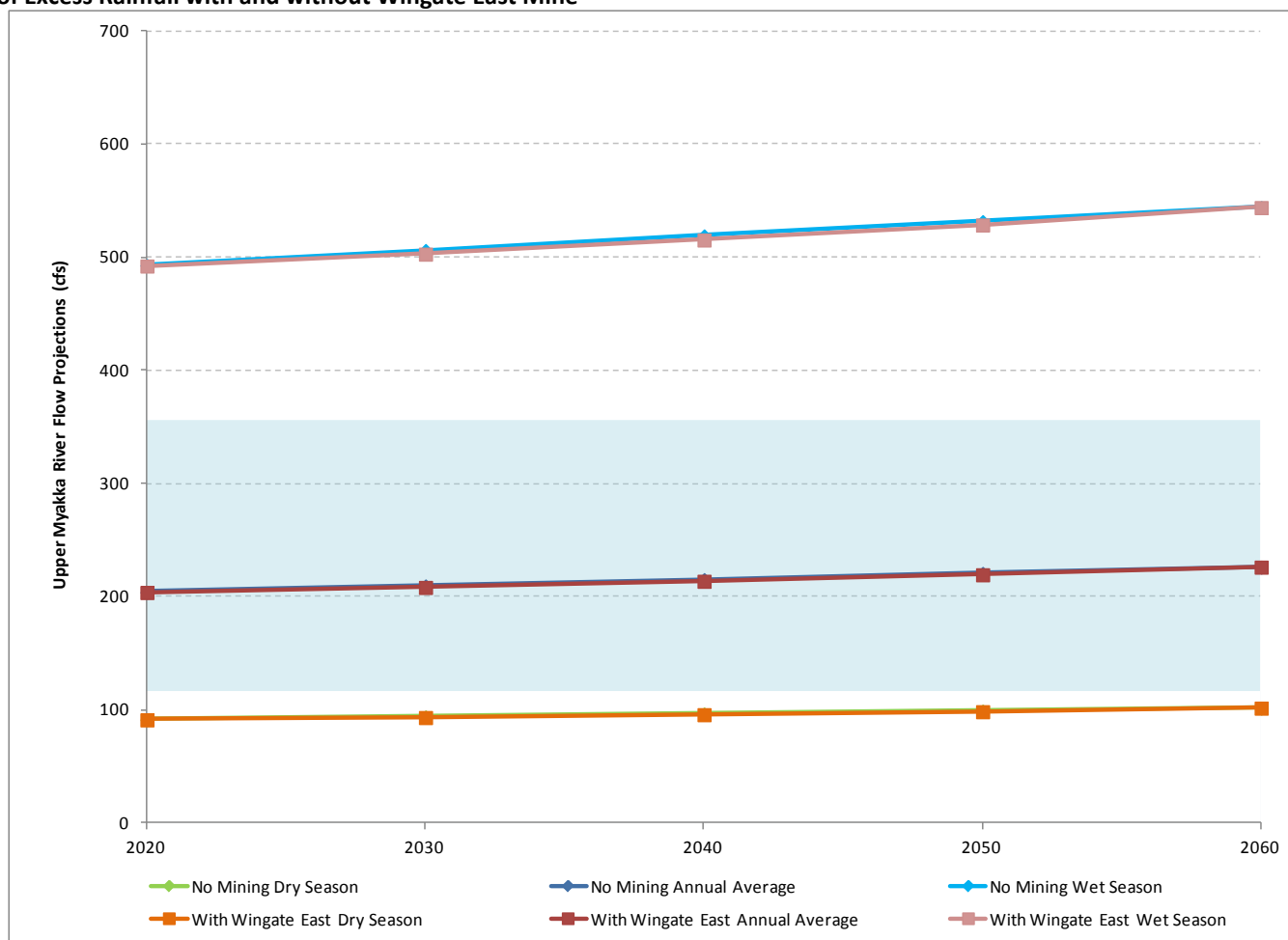
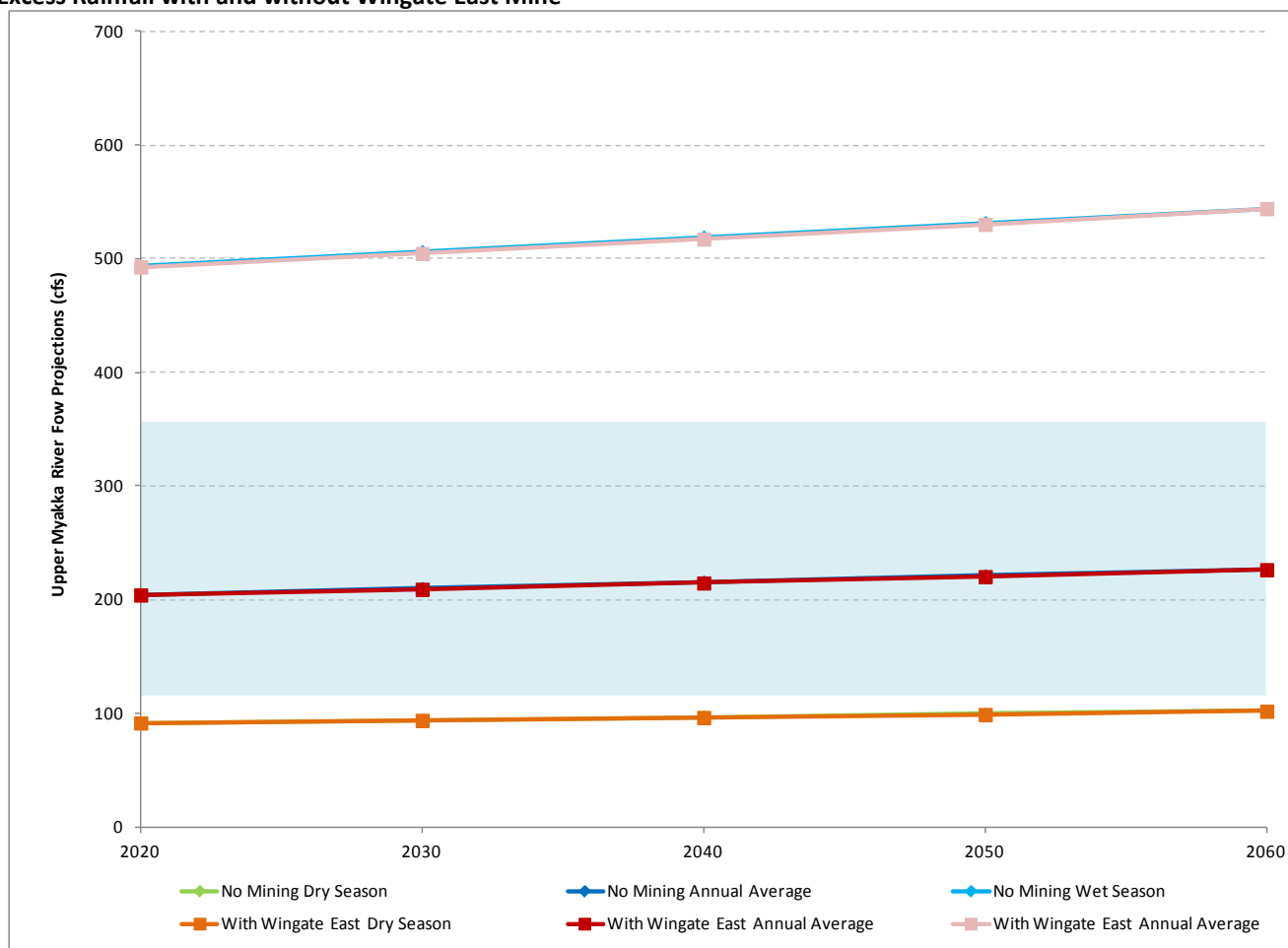


FIGURE 49

Upper Myakka River Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without Wingate East Mine



Similar to average rainfall conditions, the largest influence on annual average flow from the upper Myakka River subwatershed during low rainfall conditions was predicted to occur between 2030 and 2050 based on the capture analysis. Based on 100 percent capture of stormwater the upper Myakka River may have an average annual flow of approximately 210 to 221 cfs without the Wingate East Mine, and approximately 208 to 220 cfs with the Wingate East Mine during that period. Assuming a 50 percent capture of stormwater, the upper Myakka River may have an average annual flow of approximately 209 to 220 cfs, almost identical to the 100 percent capture case. This corresponds to a decrease in flow of about 1 cfs when compared to the No Action Alternative conditions.

The Wingate East Mine would account for a small relative contribution to the flows measured at the upper Myakka River gage station. Wingate East Mine effect on flow quantities at this station would likely not be perceivable, particularly since flows would be expected to increase because of projected land use changes in the upper Myakka River drainage area.

5.5 South Pasture Mine Extension Impacts on Runoff Characteristics and Stream Flow

Similar to the other Applicants' Preferred Alternative in the Horse Creek and Peace River at Arcadia subwatersheds, the effects of the South Pasture Mine Extension were calculated by evaluating the change to the runoff coefficients. The capture curve indicates that the most area under surface water management controls at this alternative is higher around 2030 for the both the Horse Creek and Peace River at Arcadia subwatersheds.

5.5.1 South Pasture Mine Extension Impacts on Horse Creek

Table 36 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 100 percent capture of stormwater in the capture area of the South Pasture Mine Extension at the Horse Creek flow station (near Arcadia). The maximum influence was predicted to occur around 2030, when annual average flow decreases by approximately 2 percent, dry season flow decreases by approximately 3 percent, and wet season flow decreases by approximately 1 percent from 2009 levels. However, because of changes in projected land use within this watershed, flows are predicted to increase from 2009 levels by 2060.

TABLE 36

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 100 Percent Capture at the Horse Creek Flow Station with the South Pasture Mine Extension

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	171	0%	78	0%	404	0%
2020	172	0%	77	0%	411	2%
2030	167	-2%	75	-3%	401	-1%
2040	174	2%	78	1%	418	3%
2050	175	3%	79	2%	422	4%
2060	177	3%	79	2%	424	5%

Table 37 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 50 percent capture of stormwater in the capture area of the South Pasture Mine Extension at the Horse Creek flow station. The maximum influence was predicted to occur around 2030, when annual average flow is about the same as 2009 levels, dry season flow decreases by approximately 1 percent, and wet season flow increases by approximately 1 percent. However, when considering only the South Pasture Mine Extension annual average flows are predicted to increase by approximately 3 percent when compared to 2009 flows, with dry season flows increasing by 2 percent, and a 5 percent increase in wet weather flows by 2060.

TABLE 37

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 50 Percent Capture at the Horse Creek Flow Station with the South Pasture Mine Extension

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	171	0%	78	0%	404	0%
2020	172	1%	78	0%	412	2%
2030	170	0%	76	-1%	409	1%
2040	174	2%	78	1%	418	3%
2050	175	3%	79	2%	422	4%
2060	177	3%	79	2%	424	5%

The same evaluation was performed for a low rainfall year. Table 38 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 100 percent capture of stormwater in the capture area of the South Pasture Mine Extension at the Horse Creek flow station. The maximum influence was

predicted to occur around 2030 based on the capture analysis, when annual average flow decreases by approximately 2 percent, dry season flow decreases by approximately 3 percent, and wet season flow decreases by approximately 1 percent from 2009 levels. However, annual average flows are predicted to increase by 3 percent from 2009 levels by 2060.

TABLE 38

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 100 Percent Capture at the Horse Creek Flow Station with the South Pasture Mine Extension

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	84	0%	38	0%	199	0%
2020	84	0%	38	0%	202	2%
2030	82	-2%	37	-3%	197	-1%
2040	85	2%	38	1%	205	3%
2050	86	3%	39	2%	207	4%
2060	87	3%	39	2%	209	5%

Table 39 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 50 percent capture of stormwater in the capture area of the South Pasture Mine Extension at the Horse Creek flow station. The maximum influence was predicted to occur around 2030, when annual average flow remains about the same as 2009 levels, dry season flow decreases by approximately 1 percent, and wet season flow increases by 1 percent from 2009 levels. However, when considering only the South Pasture Mine Extension, annual average flow is predicted to increase by approximately 3 percent when compared to 2009 flows with an 2 percent increase in dry season flow and a 5 percent increase in wet season flow under low rainfall conditions by 2060.

TABLE 39

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 50 Percent Capture at the Horse Creek Flow Station with the South Pasture Mine Extension

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	84	0%	38	0%	199	0%
2020	85	1%	38	0%	202	2%
2030	84	0%	38	-1%	201	1%
2040	86	2%	38	1%	206	3%
2050	86	3%	39	2%	207	4%
2060	87	3%	39	2%	209	5%

To illustrate the effect on Horse Creek stream flow under the conditions and scenarios evaluated, the results are presented graphically and compared to the No Action Alternative conditions. Figures 50 and 51 present the seasonal and annual average flows calculated for the Horse Creek gage station with and without the South Pasture Mine Extension based on 100 percent capture and 50 percent capture of stormwater, respectively, during average rainfall conditions.

FIGURE 50

Horse Creek Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without South Pasture Mine Extension

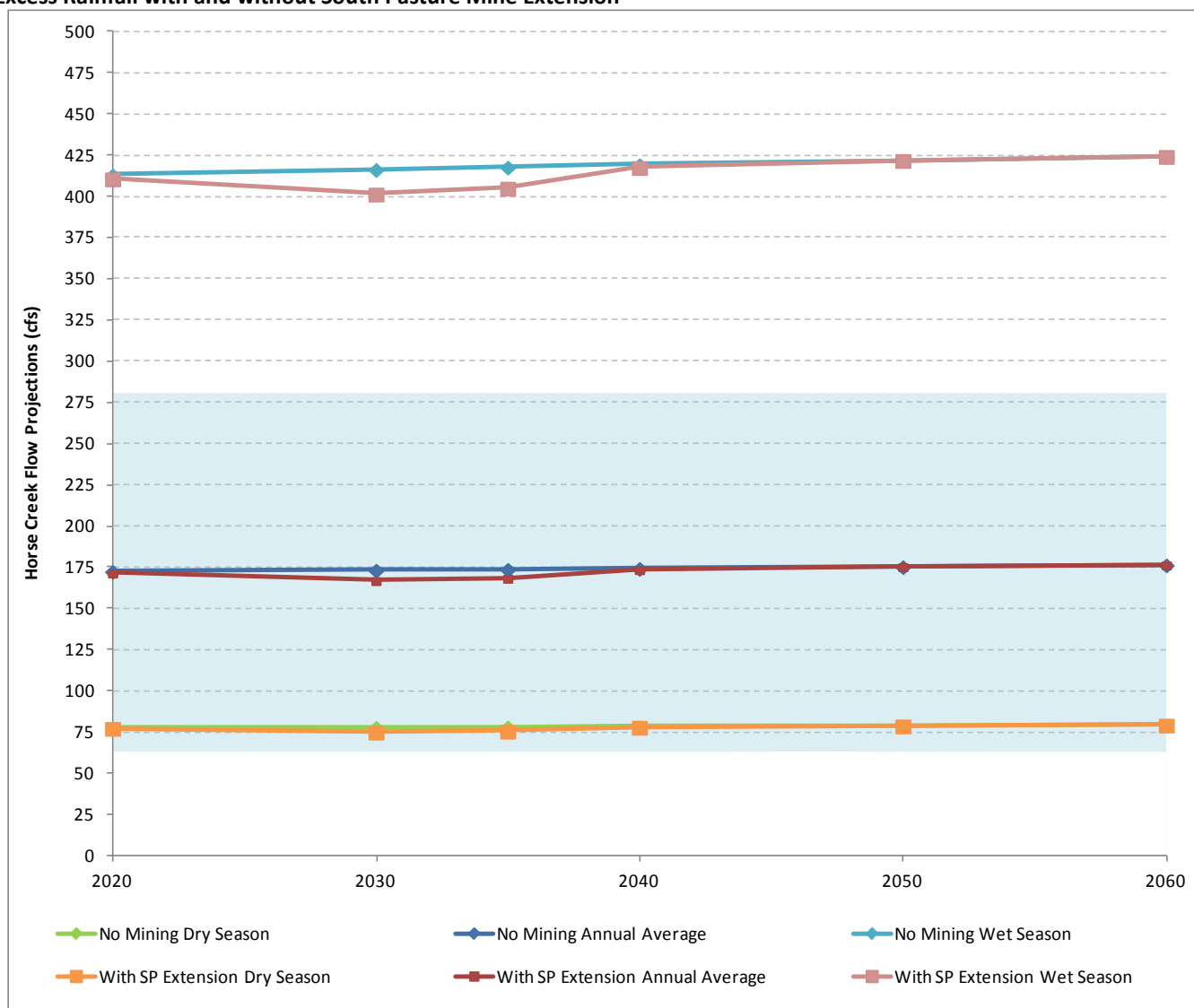
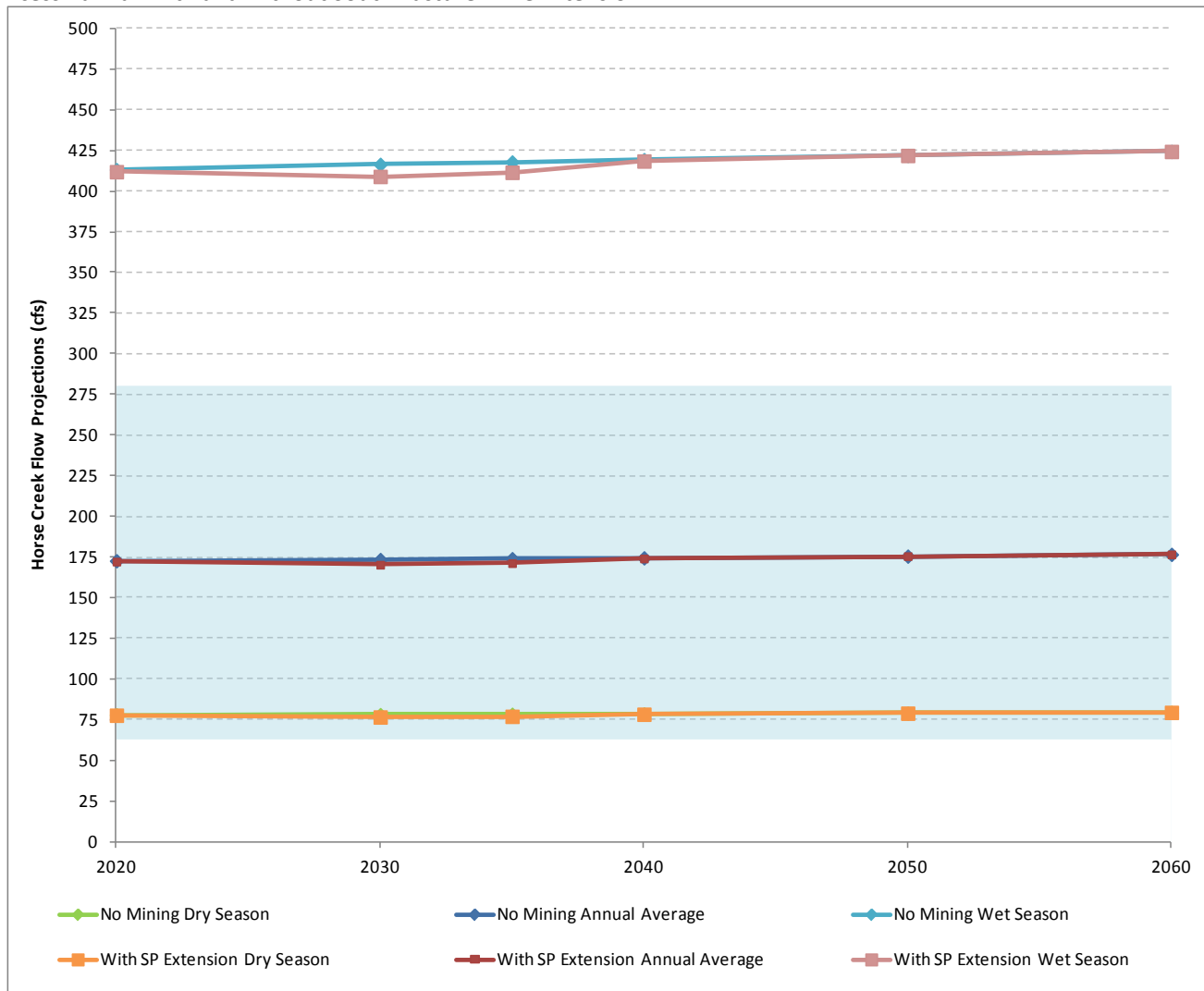


FIGURE 51

Horse Creek Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without South Pasture Mine Extension



The largest influence on annual average flow from the Horse Creek subwatershed during average rainfall conditions was predicted to occur around 2030 based on the capture analysis. Based on 100 percent capture of stormwater, Horse Creek may have an average annual flow of approximately 173 cfs without the South Pasture Mine Extension and approximately 167 cfs with the South Pasture Mine Extension. Assuming a 50 percent capture of stormwater, Horse Creek may have an average annual flow of approximately 170 cfs. This corresponds to a decrease in flow of 3 cfs when compared to the No Action Alternative conditions.

Figures 52 and 53 present the seasonal and annual average flows calculated for the Horse Creek gage station with and without the South Pasture Mine Extension based on 100 percent capture and 50 percent capture of stormwater, respectively, during low rainfall conditions.

FIGURE 52

Horse Creek Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without the South Pasture Mine Extension

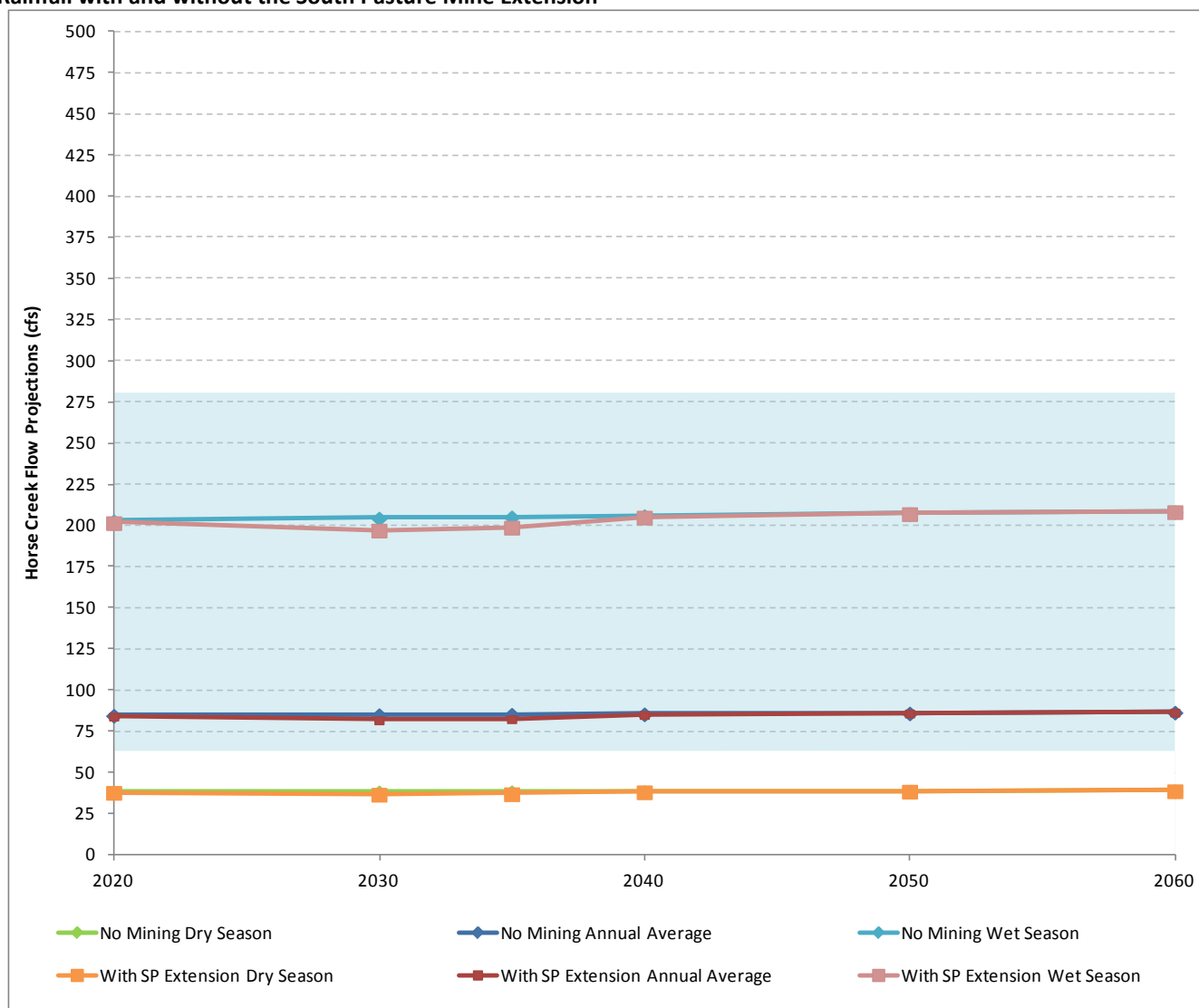
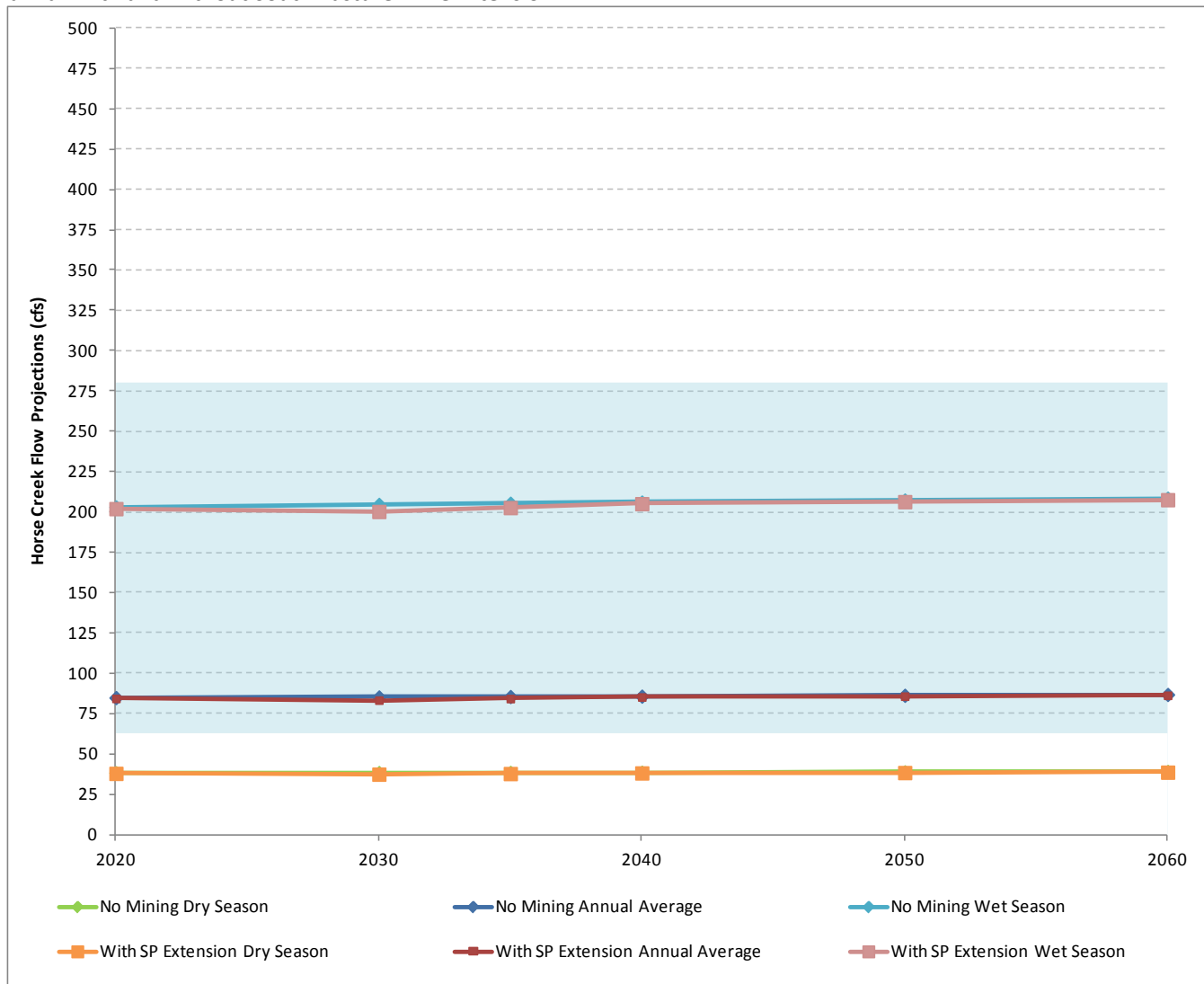


FIGURE 53

Horse Creek Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without South Pasture Mine Extension

Similar to average rainfall conditions, the largest influence on annual average flow from the Horse Creek subwatershed during low rainfall conditions was predicted to occur around 2030. Based on 100 percent capture of stormwater, Horse Creek may have an average annual flow of approximately 85 cfs without the South Pasture Mine Extension and approximately 82 cfs with the South Pasture Mine Extension. Assuming a 50 percent capture of stormwater, Horse Creek may have an average annual flow of approximately 84 cfs. This corresponds to a decrease in flow of 1 cfs when compared to the No Action Alternative conditions.

5.5.2 South Pasture Mine Extension Impacts on Peace River at Arcadia

Table 40 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 100 percent capture of stormwater in the capture area of the South Pasture Mine Extension at the Peace River at Arcadia flow station. The maximum influence was predicted to occur around 2030 based on the capture analysis. However, based on land use changes within the subwatershed and upstream subwatersheds, flows are predicted to increase during the South Pasture Mine Extension mining period. Annual average flow increases by approximately 3 percent by 2030, dry season flow increases by approximately 3 percent, and wet season flow increases by approximately 5 percent from 2009 levels. Flows are predicted to increase from 2009 levels by approximately 10 percent by 2060. Because of the small percentage of land that is being mined

compared to the total drainage area of this gage station, the changes in projected land use are predicted to have more of an effect on flow than the South Pasture Mine Extension capture.

TABLE 40

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 100 Percent Capture at the Peace River at Arcadia Flow Station with the South Pasture Mine Extension

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	713	0%	328	0%	1,657	0%
2020	726	2%	332	1%	1,702	3%
2030	738	3%	336	3%	1,740	5%
2040	754	6%	343	5%	1,785	8%
2050	772	8%	351	7%	1,829	10%
2060	783	10%	355	8%	1,858	12%

Table 41 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 50 percent capture of stormwater in the capture area of the South Pasture Mine Extension at the Peace River at Arcadia gage station. The maximum influence was predicted to occur around 2030 based on the capture analysis. However, similar to the 100 percent capture case, based on projected land use changes within the subwatershed and upstream subwatersheds, flows are predicted to increase during the South Pasture Mine Extension mining period. Annual average flow increases by approximately 3 percent by 2030, dry season flow increases by approximately 2 percent, and wet season flow increases by approximately 5 percent from 2009 levels. Flows are predicted to increase from 2009 levels by approximately 10 percent by 2060. For the 50 percent capture case, flows are projected to be about the same as in the 100 percent capture case.

TABLE 41

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 50 Percent Capture at the Peace River at Arcadia Flow Station with the South Pasture Mine Extension

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	713	0%	328	0%	1,657	0%
2020	726	2%	332	1%	1,702	3%
2030	738	3%	336	2%	1,741	5%
2040	754	6%	343	5%	1,785	8%
2050	772	8%	351	7%	1,829	10%
2060	783	10%	355	8%	1,858	12%

The same evaluation was performed for a low rainfall year. Table 42 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 100 percent capture of stormwater in the capture area of the South Pasture Mine Extension. The maximum influence is predicted to occur around 2030 based on the capture analysis. However, identical to the average rainfall scenarios, based on land use changes within the subwatershed and upstream subwatersheds, flows are predicted to increase during the South Pasture Mine Extension mining period. Annual average flow increases by approximately 4 percent by 2030, dry season

flow increases by approximately 3 percent, and wet season flow increases by approximately 5 percent from 2009 levels. Flows are predicted to increase from 2009 levels by approximately 10 percent by 2060.

TABLE 42

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 100 Percent Capture at the Peace River at Arcadia Flow Station with the South Pasture Mine Extension

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	330	0%	152	0%	766	0%
2020	337	2%	154	1%	787	3%
2030	342	4%	156	3%	806	5%
2040	350	6%	159	5%	827	8%
2050	358	9%	163	7%	848	11%
2060	363	10%	165	9%	862	13%

Table 43 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 50 percent capture of stormwater in the capture area of the South Pasture Mine Extension. The maximum influence was predicted to occur around 2030 based on the capture analysis. However, similar to the average rainfall year scenario, based on land use changes within the subwatershed and upstream subwatersheds, flows are predicted to increase during the South Pasture Mine Extension mining period. Annual average flow increases by approximately 4 percent by 2030, dry season flow increases by approximately 3 percent, and wet season flow increases by approximately 5 percent from 2009 levels. Flows are predicted to increase from 2009 levels by approximately 10 percent by 2060. Again, flows are projected to be about the same as in the 100 percent capture case.

TABLE 43

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 50 Percent Capture at the Peace River at Arcadia Flow Station with the South Pasture Mine Extension

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	330	0%	152	0%	766	0%
2020	337	2%	154	1%	787	3%
2030	342	4%	156	3%	806	5%
2040	350	6%	159	5%	827	8%
2050	358	9%	163	7%	848	11%
2060	363	10%	165	9%	862	13%

To illustrate the effect on Peace River at Arcadia stream flow under the conditions and scenarios evaluated, the results are presented graphically and compared to the No Action Alternative conditions. Figures 54 and 55 present the seasonal and annual average flows calculated for the Peace River at Arcadia gage station with and without the South Pasture Mine Extension based on 100 percent capture and 50 percent capture of stormwater respectively during average rainfall conditions.

FIGURE 54

Peace River at Arcadia Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without the South Pasture Mine Extension

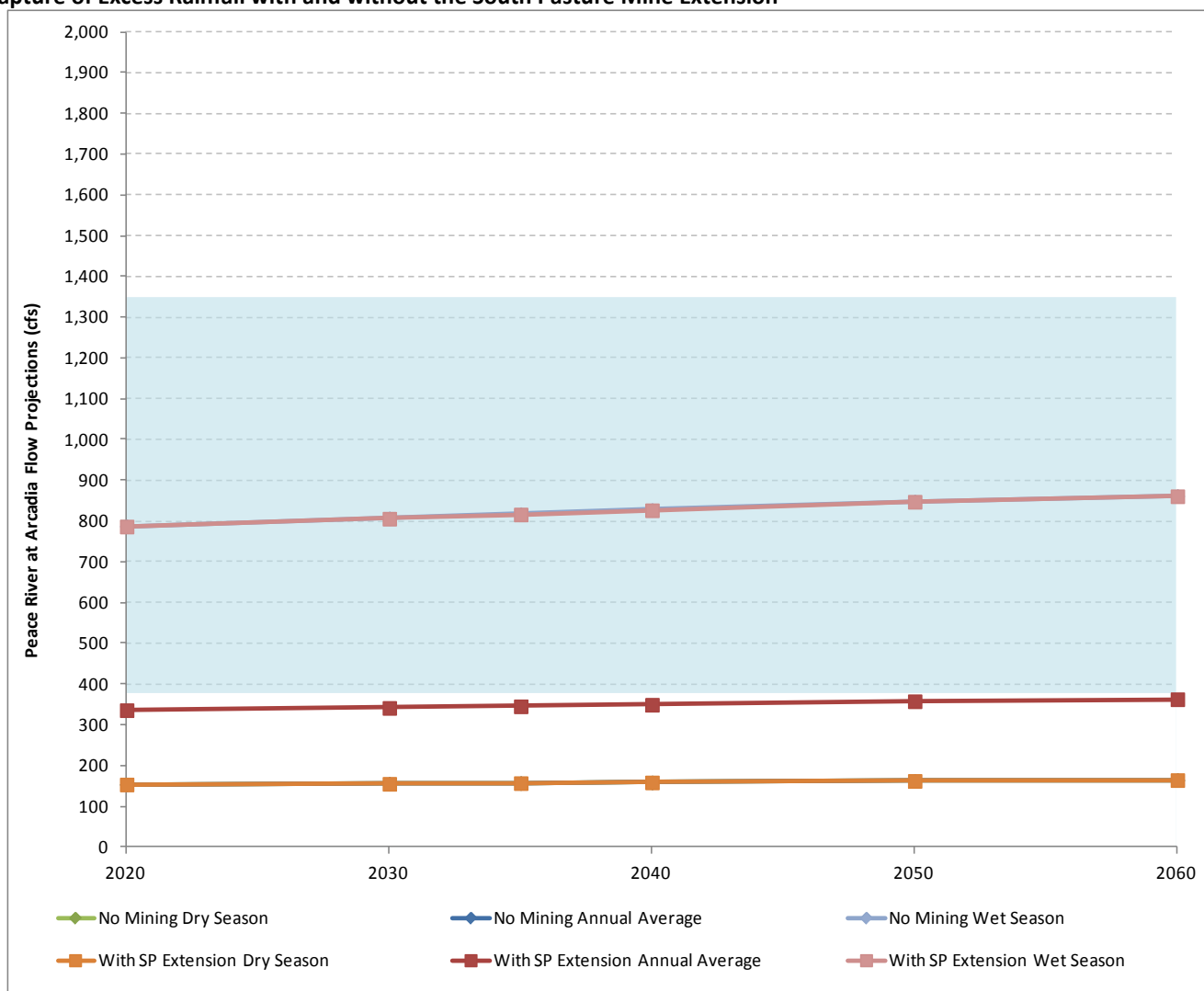
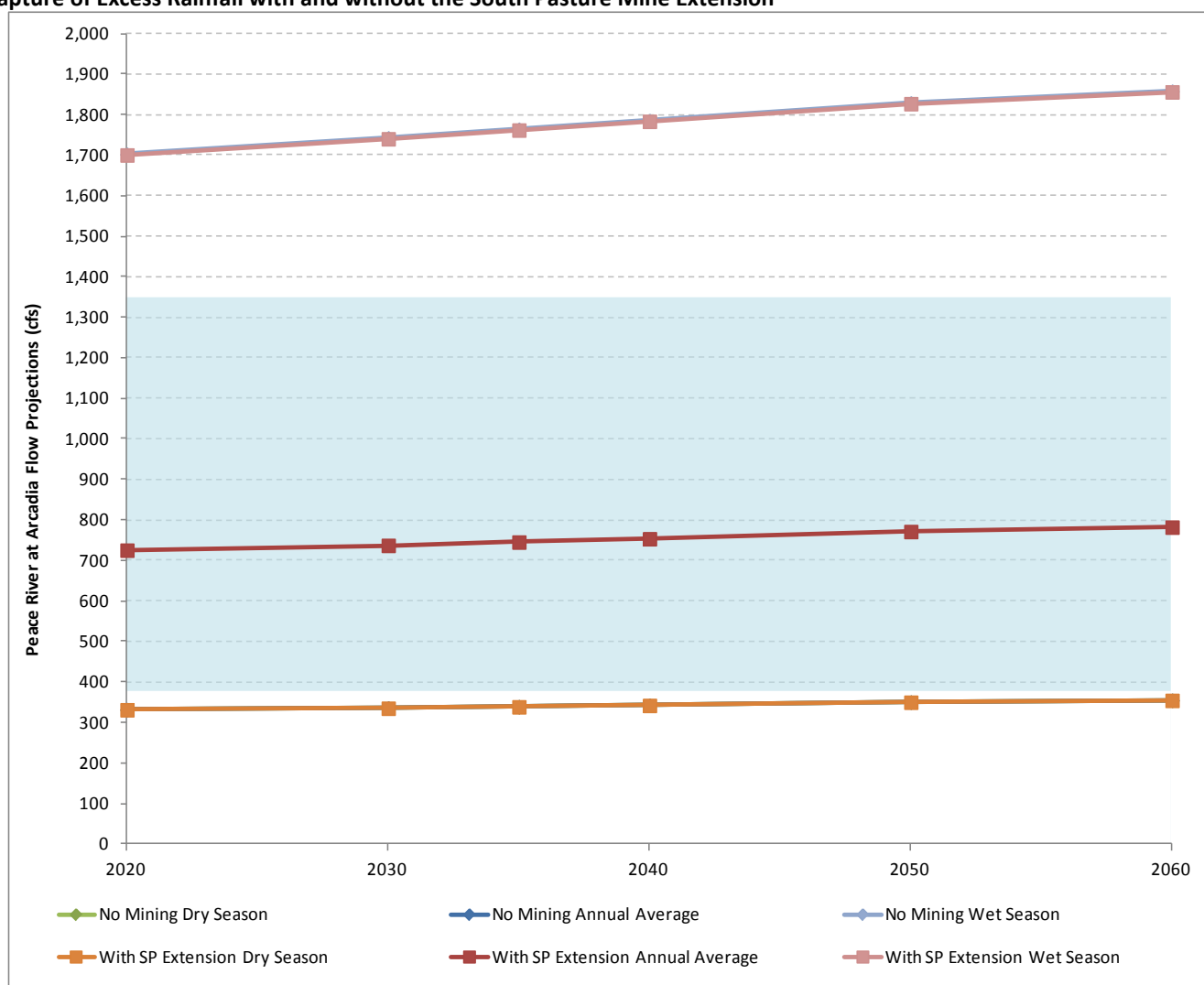


FIGURE 55

Peace River at Arcadia Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without the South Pasture Mine Extension



The largest influence on annual average flow from the Peace River at Arcadia subwatershed during average rainfall conditions are predicted to occur around 2030 based on the capture analysis. Based on 100 percent capture of stormwater, Peace River at Arcadia may have an average annual flow of approximately 738 cfs without the South Pasture Mine Extension and approximately 738 cfs with the South Pasture Mine Extension by 2030. No reductions in flow in this subwatershed resulting from mine capture are expected. Assuming a 50 percent capture of stormwater, Peace River at Arcadia may have an average annual flow of approximately 738 cfs as well, similar to the 100 percent capture case.

Figures 56 and 57 present the seasonal and annual average flows calculated for the Peace River at Arcadia gage station with and without the South Pasture Mine Extension based on 100 percent capture and 50 percent capture of stormwater, respectively, during low rainfall conditions.

FIGURE 56

Peace River at Arcadia Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without the South Pasture Mine Extension

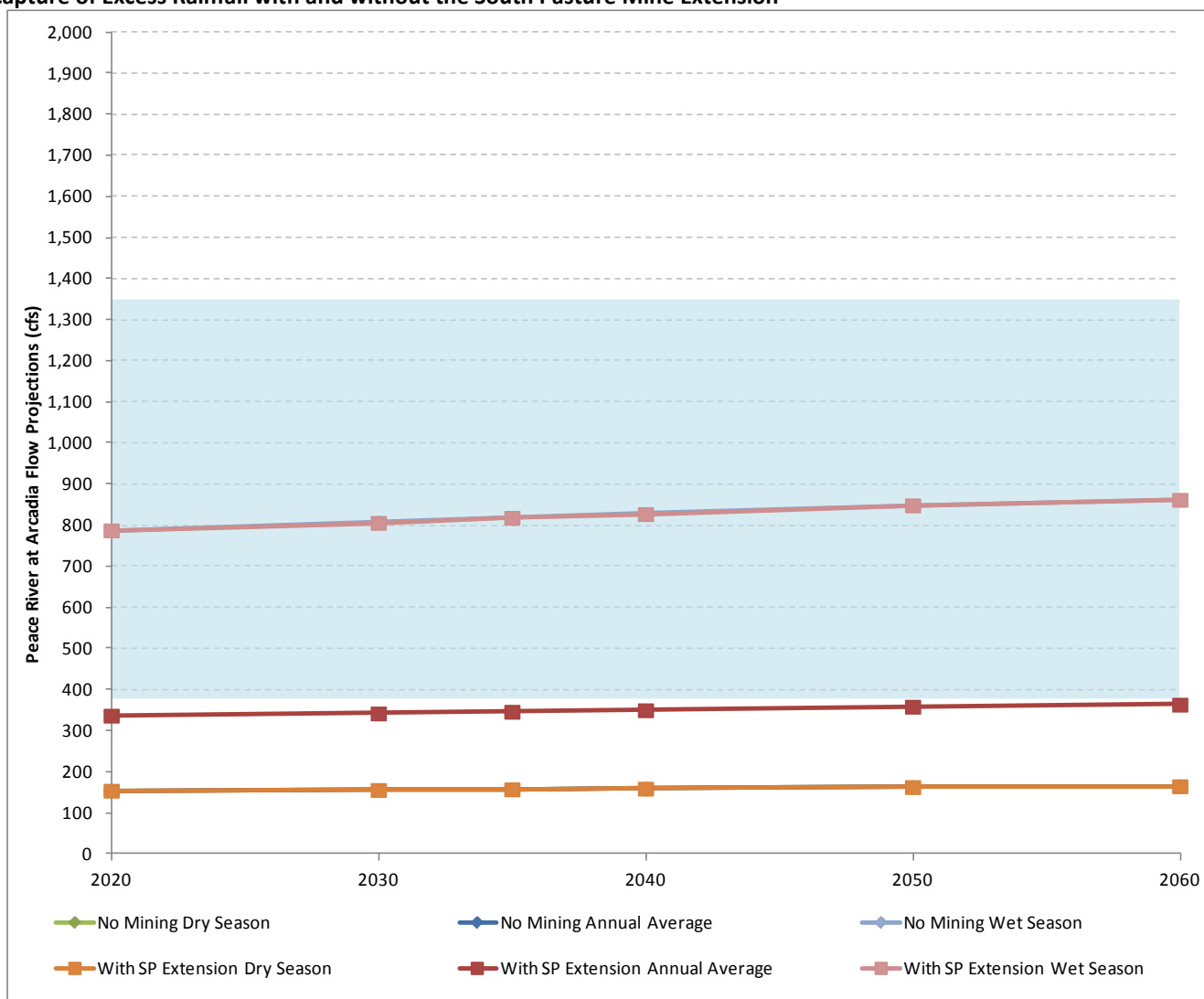
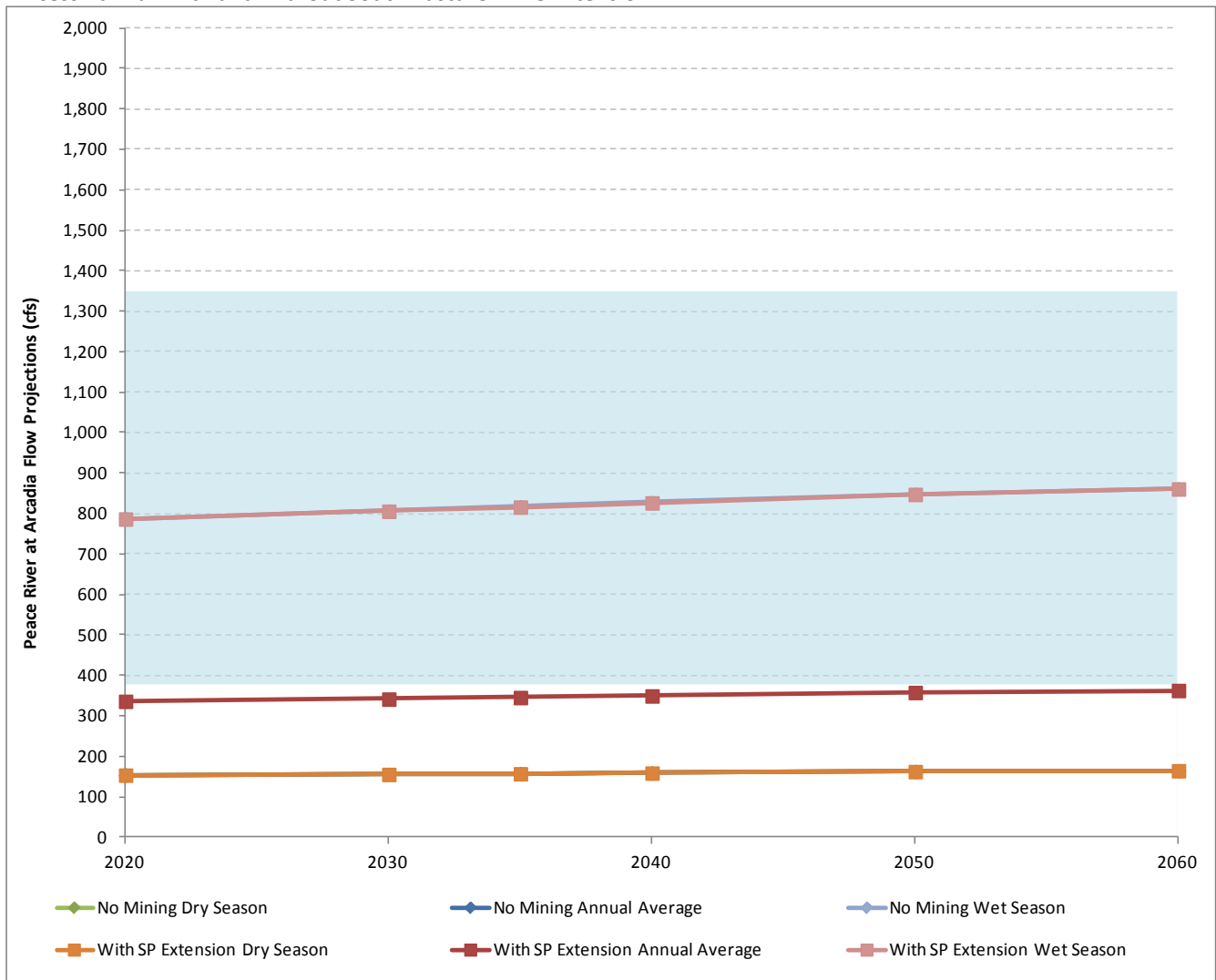


FIGURE 57

Peace River at Arcadia Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without South Pasture Mine Extension



Similar to average rainfall conditions, the largest influence on annual average flow from the Horse Creek subwatershed during low rainfall conditions was predicted to occur around 2030 based on the capture analysis. Based on 100 percent capture of stormwater Horse Creek may have an average annual flow of approximately 342 cfs without the South Pasture Mine Extension and the same approximate 342 cfs flow with the South Pasture Mine Extension by 2030. Assuming a 50 percent capture of stormwater, Horse Creek may have an average annual flow of approximately 342 cfs, similar to the 100 percent capture case.

The South Pasture Mine Extension would account for a small relative contribution to the flows measured at the Peace River at Arcadia gage station. The South Pasture Mine Extension effect on flow quantities at this station would likely not be perceivable, particularly since flows are expected to increase as a result of land use changes in the Peace River at Arcadia drainage area.

5.6 Pine Level/Keys Offsite Alternative Impacts on Runoff Characteristics and Stream Flow

The first part of this analysis looks at the potential direct and indirect effects of the Pine Level/Keys Tract as a stand-alone, offsite alternative. For the stand-alone analysis a start date of 2025 was assumed.

The second part of the analysis considers the Pine Level/Keys Tract as an extension of the Desoto Mine, with a start date of 2034. This was done for use later in the cumulative analysis which includes the Pine Level/Keys Tract as a reasonably foreseeable action.

5.6.1 Pine Level/Keys Tract Alternative Year 2025 Implementation

A portion of Pine Level/Keys is in Horse Creek, but most of the alternative is in the Big Slough subwatershed, which is part of the Lower Myakka River subwatershed. As with other alternatives, the potential effects of the capture of stormwater was analyzed for each subwatershed separately.

5.6.1.1 Pine Level/Keys Tract Year 2025 Implementation Effects on Big Slough

The Big Slough Basin drains toward the City of North Port and Myakkahatchee Creek, which joins the Myakka River very near where it flows into Charlotte Harbor. Therefore, this mine's drainage area would not influence flows in the Myakka River except as they contribute to Charlotte Harbor (for the cumulative effect analysis). Table 44 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 100 percent capture of stormwater in the capture area of the Pine Level/Keys Tract in Big Slough Basin. The maximum influence was predicted to occur between 2045 and 2050 according to the capture analysis. Annual average flow decreases by approximately 6 percent by 2050, dry season flow decreases by approximately 5 percent, and wet season flow decreases by approximately 5 percent from 2009 levels. Unlike the other alternatives studied, the annual flow rates were not estimated to increase in Big Slough Basin in this analysis from changes to future land use (because future land use predictions were not made here), but eventually the areas mined would be reclaimed and these potential flow reductions during active mining returned to near pre-mining conditions.

TABLE 44

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 100 Percent Capture in Big Slough Basin with the Pine Level/Keys Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	217	0%	117	0%	629	0%
2020	217	0%	117	0%	629	0%
2030	206	-5%	111	-5%	596	-5%
2040	207	-5%	111	-5%	599	-5%
2050	203	-6%	109	-7%	589	-6%
2060	215	-1%	116	-1%	623	-1%

Table 45 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 50 percent capture of stormwater in the capture area of the Pine Level/Keys Tract in Big Slough Basin. The maximum influence was predicted to occur between 2045 and 2050 based on the capture analysis. Annual average flow decreases by approximately 3 percent by 2050, dry season flow decreases by approximately 3 percent, and wet season flow decreases by approximately 3 percent from 2009 levels.

TABLE 45

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 50 Percent Capture in Big Slough Basin with the Pine Level/Keys Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	217	0%	117	0%	629	0%
2020	217	0%	117	0%	629	0%
2030	212	-3%	114	-3%	613	-3%
2040	212	-2%	114	-2%	614	-2%
2050	210	-3%	113	-3%	609	-3%
2060	216	<-1%	116	<-1%	626	<-1%

The same evaluation was performed for a low rainfall year. Table 46 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 100 percent capture of stormwater in the capture area of the Pine Level/Keys Tract. The maximum influence is predicted to occur between 2045 and 2050 based on the capture analysis. Flows are predicted to decrease during the Pine Level/Keys Tract mining period. Annual average flow decreases by approximately 6 percent by 2050, dry season flow decreases by approximately 7 percent, and wet season flow decreases by approximately 6 percent from 2009 levels.

TABLE 46

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 100 Percent Capture in Big Slough Basin with the Pine Level/Keys Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	176	0%	95	0%	511	0%
2020	176	0%	95	0%	511	0%
2030	167	-5%	90	-5%	484	-5%
2040	168	-5%	90	-5%	486	-5%
2050	165	-6%	89	-7%	478	-6%
2060	175	-1%	94	-1%	506	-1%

Table 47 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 50 percent capture of stormwater in the capture area of the Pine Level/Keys Tract. The maximum influence was predicted to occur between 2045 and 2050 based on the capture analysis. Similar to the average rainfall year scenario, annual average flow decreases by approximately 3 percent by 2050, dry season flow decreases by approximately 3 percent, and wet season flow decreases by approximately 3 percent from 2009 levels.

TABLE 47

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 50 Percent in Big Slough Basin with the Pine Level/Keys Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	176	0%	95	0%	511	0%
2020	176	0%	95	0%	511	0%
2030	172	-3%	92	-3%	497	-3%
2040	172	-2%	92	-2%	498	-2%
2050	171	-3%	92	-3%	494	-3%
2060	176	0%	94	<-1%	508	<-1%

To illustrate the effect on Big Slough Basin stream flow under the conditions and scenarios evaluated, the results are presented graphically and compared to the No Action Alternative conditions. Figures 58 and 59 present the seasonal and annual average flows calculated for Big Slough Basin with and without the Pine Level/Keys Tract based on 100 percent capture and 50 percent capture of stormwater, respectively, during average rainfall conditions. The range of one standard deviation was not plotted because sufficient flow data were not available for this subwatershed.

FIGURE 58

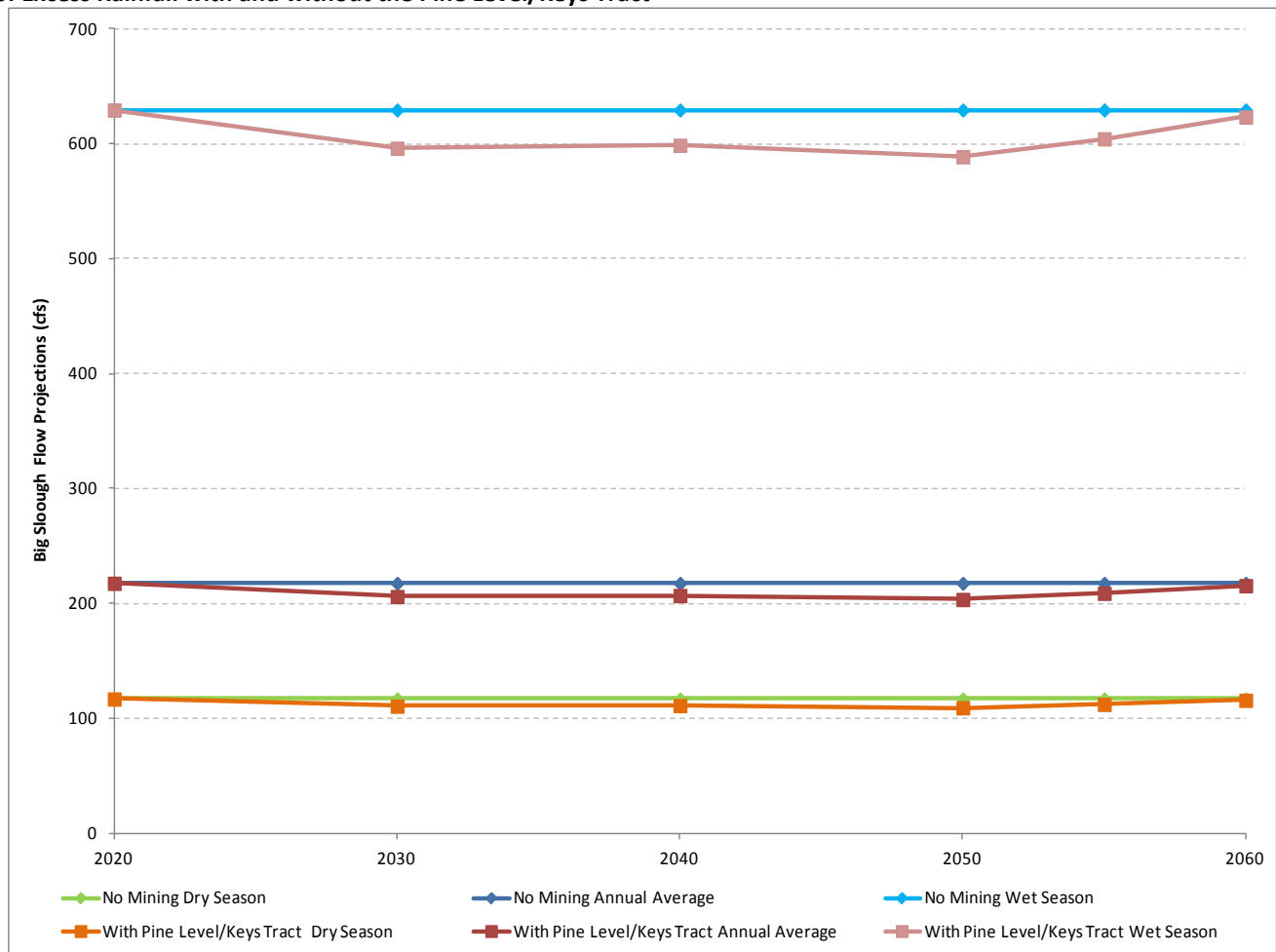
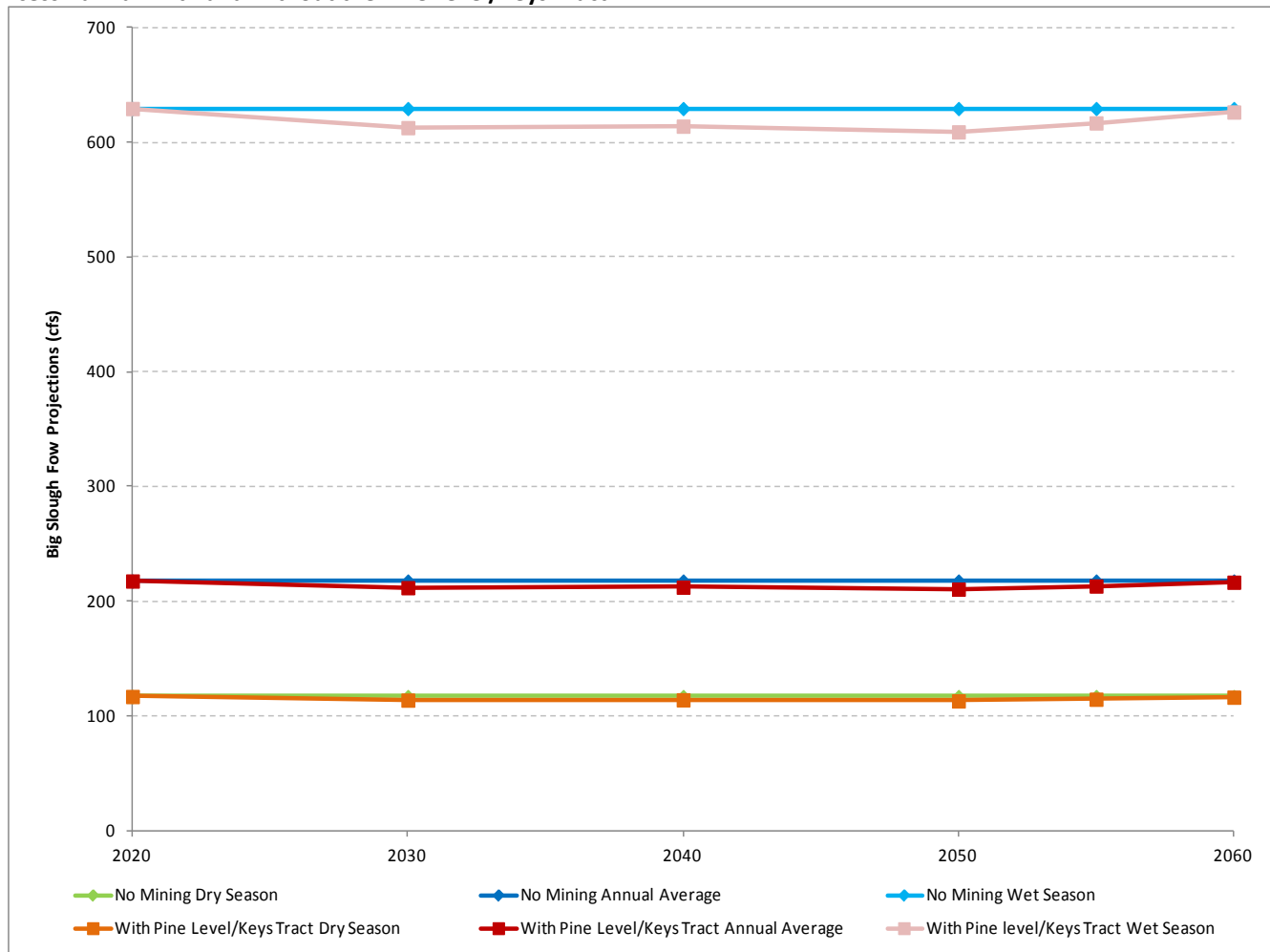
Big Slough Basin Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without the Pine Level/Keys Tract

FIGURE 59

Big Slough Basin Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without the Pine Level/Keys Tract



The largest influence on annual average flow from the upper Myakka River subwatershed during average rainfall conditions is predicted to occur 2050 based on the capture analysis. Based on 100 percent capture of stormwater, Big Slough Basin may have an average annual flow of approximately 217 cfs without the Pine Level/Keys Tract and approximately 203 cfs with the Pine Level/Keys Tract during that period. Assuming a 50 percent capture of stormwater, Big Slough Basin may have an average annual flow of approximately 210 cfs. This corresponds to a decrease in flow of 7 cfs when compared to the No Action Alternative conditions.

Figures 60 and 61 present the seasonal and annual average flows calculated for Big Slough Basin with and without the Pine Level/Keys Tract based on 100 percent capture and 50 percent capture of stormwater, respectively, during low rainfall conditions.

FIGURE 60

Big Slough Basin Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without Pine Level/Keys Tract

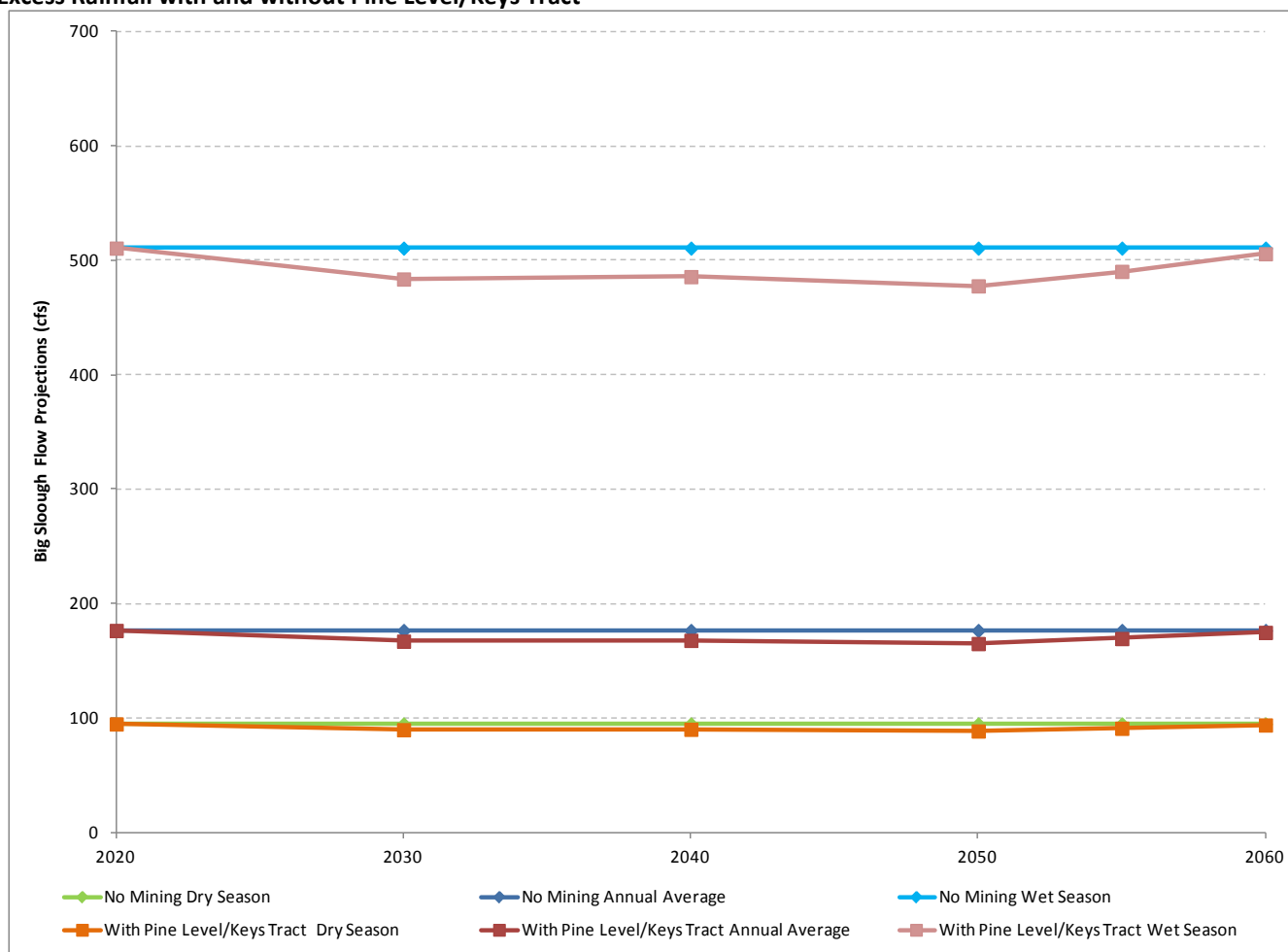
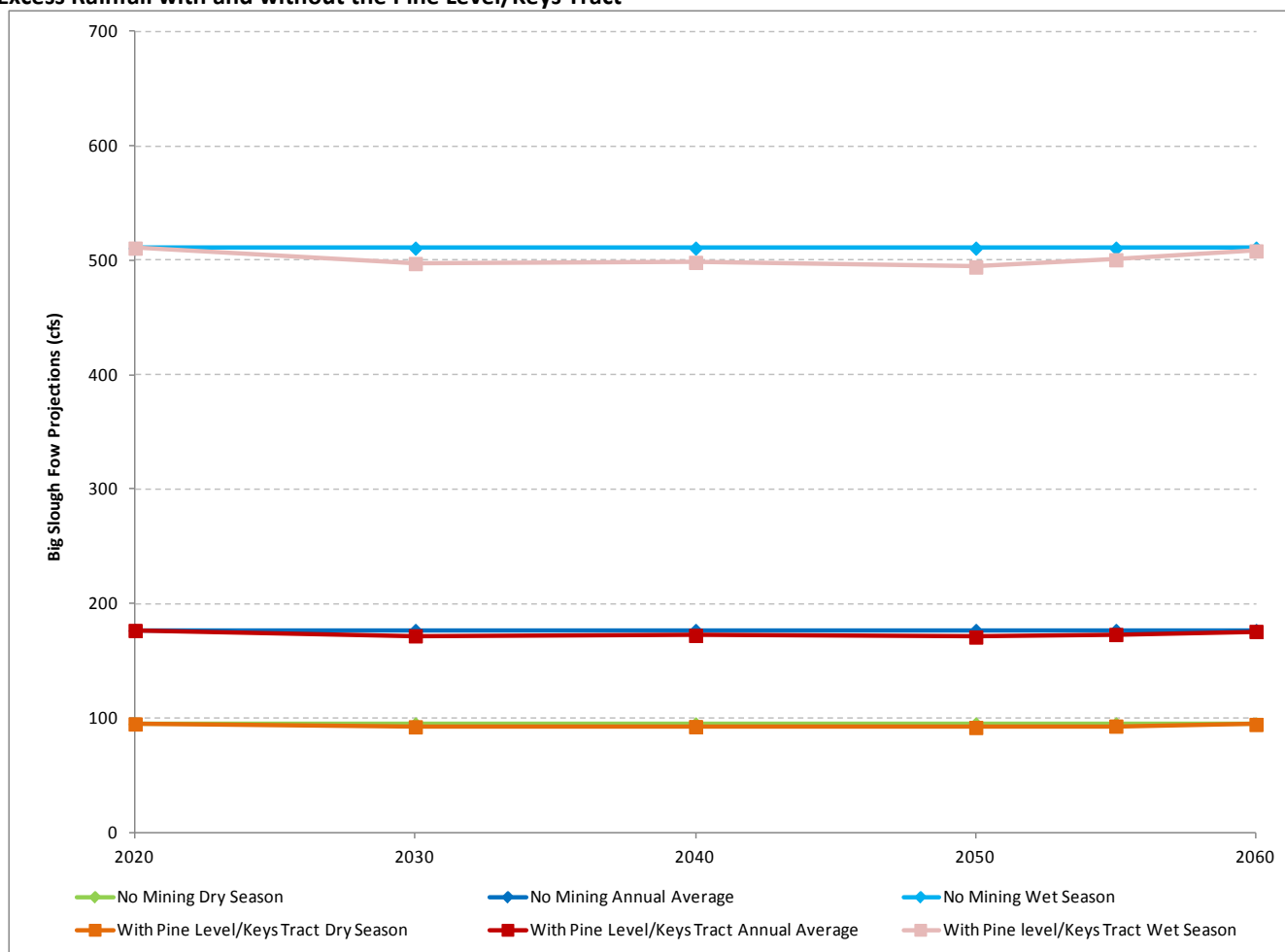


FIGURE 61

Big Slough Basin Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without the Pine Level/Keys Tract



Similar to average rainfall conditions, the largest influence on annual average flow from the Big Slough Basin during low rainfall conditions was predicted to occur around 2050. Based on 100 percent capture of stormwater, the Big Slough Basin may have an average annual flow of approximately 176 cfs without the Pine Level/Keys Tract, and approximately 165 cfs with the Pine Level/Keys Tract. Assuming a 50 percent capture of stormwater, the Big Slough Basin may have an average annual flow of approximately 171 cfs. This corresponds to a decrease in flow of 5 cfs. The Pine Level/Keys Tract effects on flow quantities in Big Slough Basin would likely be relatively small, most perceptible during high flow periods, and projected far into the future. The SWFWMD plans to revisit the flows in this watershed in more detail after more data are collected near the City of North Port.

5.6.1.2 Pine Level/Keys Tract Year 2025 Implementation Effects on Horse Creek

A portion of the Pine Level/Keys Tract (about 3,480 acres) drains into the Horse Creek subwatershed. Table 48 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 100 percent capture of stormwater in the capture area of the Pine Level/Keys Tract in Horse Creek subwatershed. The maximum influence was predicted to occur around 2040 according to the capture analysis. Annual average flow increases by approximately 1 percent by 2040, dry season flow increases less than 1 percent, and wet season flow increases by approximately 2 percent from 2009 levels. Eventually the areas mined would be reclaimed and these potential flow reductions during active mining returned to near pre-mining conditions.

TABLE 48

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 100 Percent Capture in Horse Creek Flow Station with the Pine Level/Keys Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	171	0%	78	0%	404	0%
2020	173	1%	78	0%	413	2%
2030	173	1%	78	0%	416	3%
2040	172	1%	77	<1%	414	2%
2050	173	1%	78	0%	417	3%
2060	176	3%	79	2%	424	5%

Table 49 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 50 percent capture of stormwater in the capture area of the Pine Level/Keys Tract in Horse Creek subwatershed. The maximum influence was predicted to occur around 2040 based on the capture analysis. Annual average flow increases by approximately 1 percent by 2040, dry season flow remains about the same, and wet season flow increases by approximately 3 percent from 2009 levels.

TABLE 49

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 50 Percent Capture in Horse Creek Flow Station with the Pine Level/Keys Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	171	0%	78	0%	404	0%
2020	173	1%	78	0%	413	2%
2030	173	1%	78	0%	416	3%
2040	173	1%	78	0%	417	3%
2050	174	2%	78	<1%	419	4%
2060	176	3%	79	2%	424	5%

The same evaluation was performed for a low rainfall year. Table 50 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 100 percent capture of stormwater in the capture area of the Pine Level/Keys Tract. The maximum influence was predicted to occur around 2040 based on the capture analysis. Annual average flow increases by approximately 1 percent by 2040, dry season flow remains about the same, and wet season flow increases by approximately 2 percent from 2009 levels.

TABLE 50

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 100 Percent Capture Horse Creek Flow Station with the Pine Level/Keys Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	84	0%	38	0%	199	0%
2020	85	1%	38	0%	203	2%
2030	85	1%	38	0%	204	3%
2040	85	1%	38	0%	204	2%
2050	85	1%	38	0%	205	3%
2060	87	3%	39	2%	208	5%

Table 51 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 50 percent capture of stormwater in the capture area of the Pine Level/Keys Tract. The maximum influence was predicted to occur around 2040 based on the capture analysis. Annual average flow increases by approximately 1 percent by 2040, dry season flow remains about the same, and wet season flow increases by approximately 3 percent from 2009 levels.

TABLE 51

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 50 Percent Horse Creek Flow Station with the Pine Level/Keys Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	84	0%	38	0%	199	0%
2020	85	1%	38	0%	203	2%
2030	85	1%	38	0%	204	3%
2040	85	1%	38	0%	205	3%
2050	86	2%	39	1%	206	4%
2060	87	3%	39	2%	208	5%

To illustrate the effect on Horse Creek subwatershed stream flow under the conditions and scenarios evaluated, the results are presented graphically and compared to the No Action Alternative conditions. Figures 62 and 63 present the seasonal and annual average flows calculated for Horse Creek subwatershed with and without the Pine Level/Keys Tract based on 100 percent capture and 50 percent capture of stormwater, respectively, during average rainfall conditions.

FIGURE 62

Horse Creek Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without the Pine Level/Keys Tract

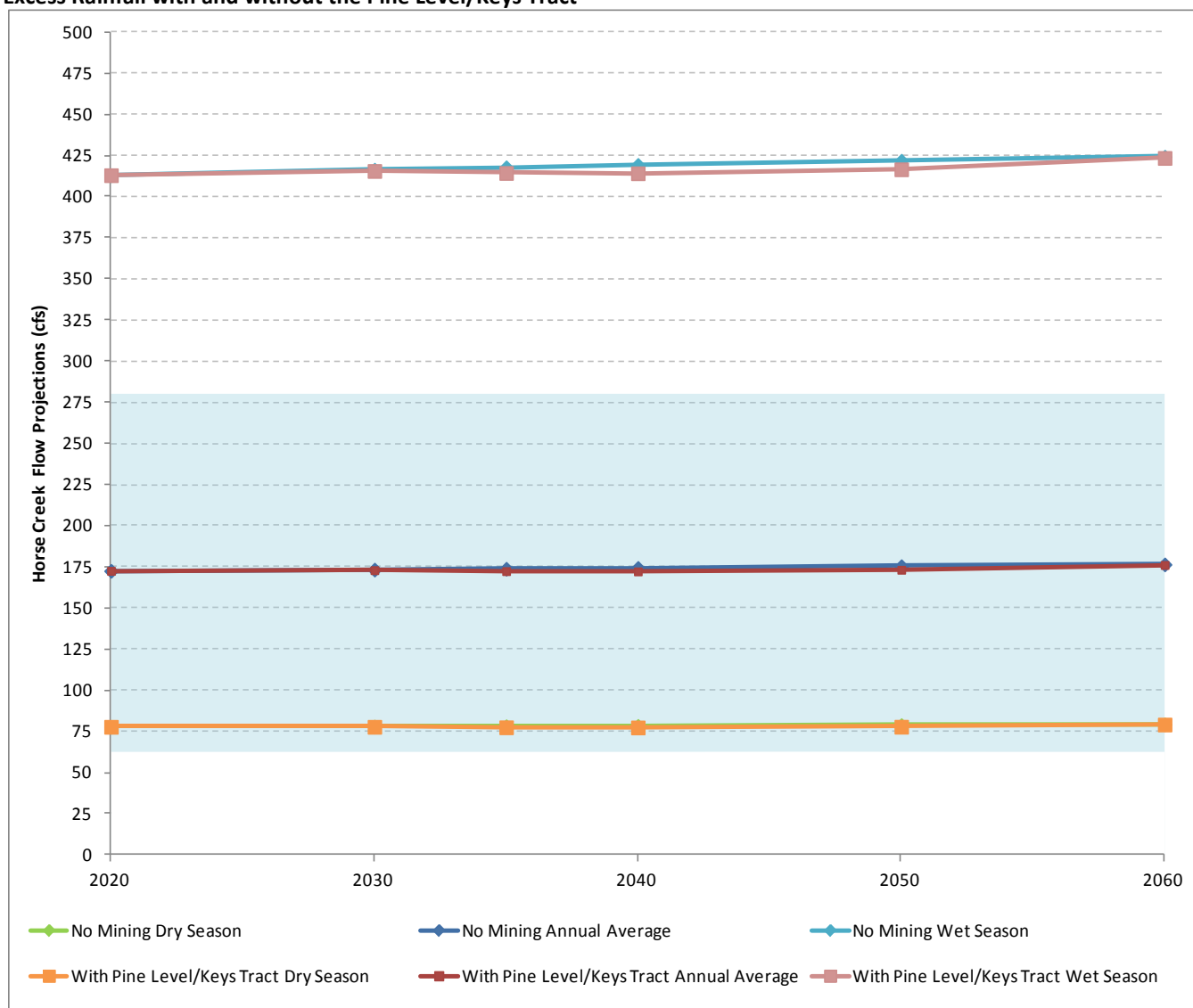
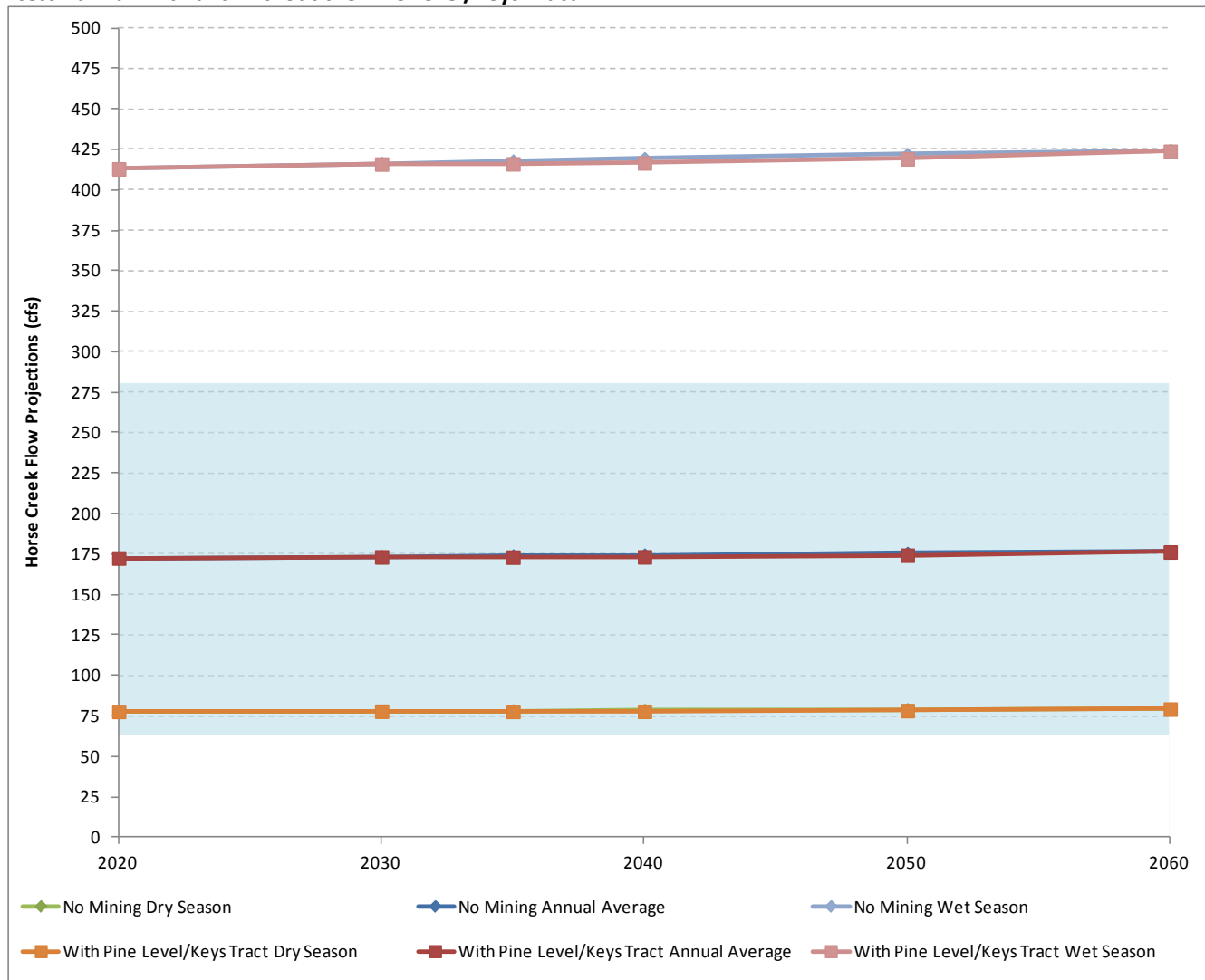


FIGURE 63

Horse Creek Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without the Pine Level/Keys Tract

The largest influence on annual average flow from the Horse Creek subwatershed during average rainfall conditions is predicted to occur 2040 based on the capture analysis. Based on 100 percent capture of stormwater, Horse Creek subwatershed may have an average annual flow of approximately 174 cfs without the Pine Level/Keys Tract and approximately 172 cfs with the Pine Level/Keys Tract during that period. Assuming a 50 percent capture of stormwater, Horse Creek subwatershed may have an average annual flow of approximately 173 cfs. This corresponds to a decrease in flow of 1 cfs when compared to the No Action Alternative conditions.

Figures 64 and 65 present the seasonal and annual average flows calculated for Horse Creek subwatershed with and without the Pine Level/Keys Tract based on 100 percent capture and 50 percent capture of stormwater, respectively, during low rainfall conditions.

FIGURE 64

Horse Creek Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without Pine Level/Keys Tract

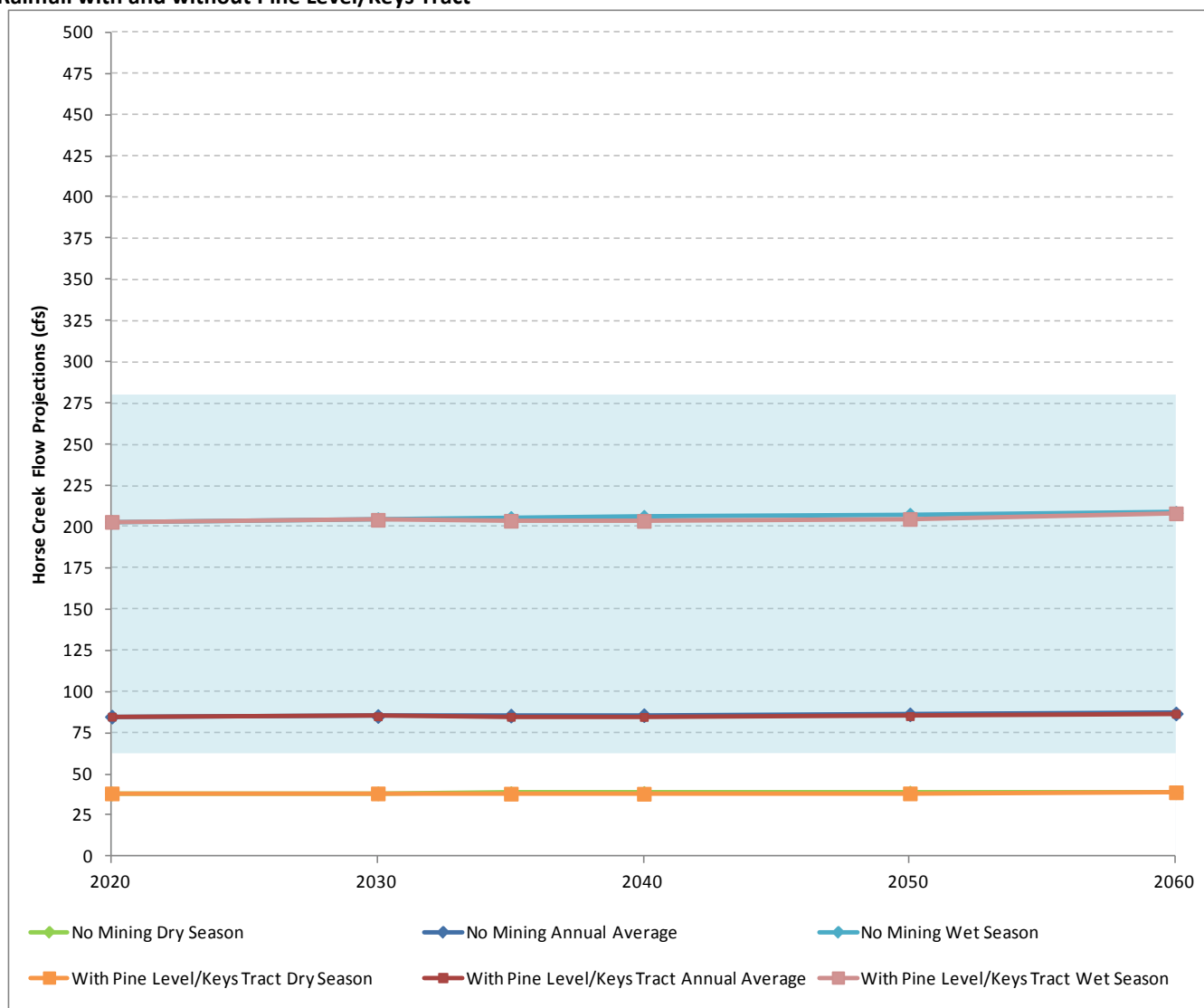
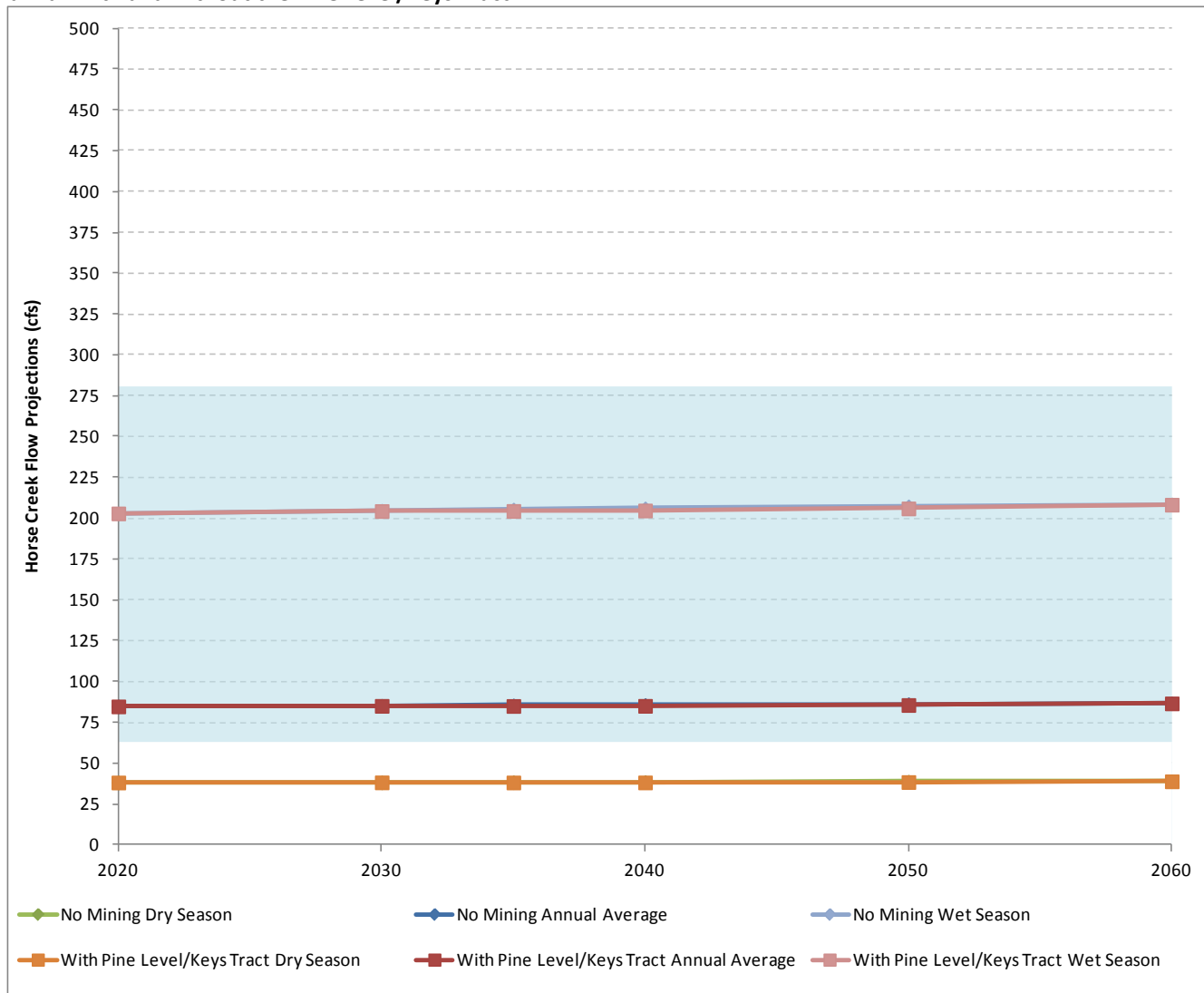


FIGURE 65

Horse Creek Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without the Pine Level/Keys Tract



Similar to average rainfall conditions, the largest influence on annual average flow from the Horse Creek subwatershed during low rainfall conditions was predicted to occur around 2040. Based on 100 percent capture of stormwater, the Horse Creek subwatershed may have an average annual flow of approximately 86 cfs without the Pine Level/Keys Tract, and approximately 85 cfs with the Pine Level/Keys Tract. Assuming a 50 percent capture of stormwater, the Horse Creek subwatershed may have an average annual flow of approximately 85 cfs. This corresponds to a decrease in flow of 1 cfs.

5.6.2 Pine Level/Keys Tract Alternative Year 2034 Implementation

5.6.2.1 Pine Level/Keys Tract Year 2034 Implementation Effects on Big Slough

Table 52 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 100 percent capture of stormwater in the capture area of the Pine Level/Keys Tract in Big Slough Basin. The capture curves indicate that the most area under surface water management controls at this alternative is around 2055 for the Big Slough subwatershed. Therefore, an additional analysis was conducted to evaluate the near peak capture conditions. Annual average flow decreases by approximately 7 percent by 2055, dry season flow decreases by approximately 7 percent, and wet season flow decreases by approximately 7 percent from 2009 levels. Unlike the other alternatives studied, the annual flow rates were not increased in Big

Slough Basin in this analysis from changes to future land use, but eventually the areas mined would be reclaimed and these potential flow reductions during active mining returned to near pre-mining conditions.

TABLE 52

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 100 Percent Capture in Big Slough Basin with the Pine Level/Keys Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	217	0%	117	0%	629	0%
2020	217	0%	117	0%	629	0%
2030	217	0%	117	0%	629	0%
2040	206	-5%	111	-5%	596	-5%
2050	207	-5%	111	-5%	599	-5%
2055	202	-7%	108	-7%	584	-7%
2060	203	-6%	109	-7%	589	-6%

Table 53 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 50 percent capture of stormwater in the capture area of the Pine Level/Keys Tract in Big Slough Basin. The maximum influence was predicted to occur around 2055 based on the capture analysis. Annual average flow decreases by approximately 4 percent by 2055, dry season flow decreases by approximately 4 percent, and wet season flow decreases by approximately 4 percent from 2009 levels.

TABLE 53

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 50 Percent Capture in Big Slough Basin with the Pine Level/Keys Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	217	0%	117	0%	629	0%
2020	217	0%	117	0%	629	0%
2030	217	0%	117	0%	629	0%
2040	212	-3%	114	-3%	613	-3%
2050	212	-2%	114	-2%	614	-2%
2055	210	-4%	113	-4%	607	-4%
2060	210	-3%	113	-3%	609	-3%

The same evaluation was performed for a low rainfall year. Table 54 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 100 percent capture of stormwater in the capture area of the Pine Level/Keys Tract. The maximum influence is predicted to occur around 2055 based on the capture analysis. Flows are predicted to decrease during the Pine Level/Keys Tract mining period. Annual average flow decreases by approximately 7 percent by 2055, dry season flow decreases by approximately 7 percent, and wet season flow decreases by approximately 7 percent from 2009 levels.

TABLE 54

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 100 Percent Capture in Big Slough Basin with the Pine Level/Keys Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	176	0%	95	0%	511	0%
2020	176	0%	95	0%	511	0%
2030	176	0%	95	0%	511	0%
2040	167	-5%	90	-5%	484	-5%
2050	168	-5%	90	-5%	486	-5%
2055	164	-7%	88	-7%	474	-7%
2060	165	-6%	89	-7%	478	-6%

Table 55 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 50 percent capture of stormwater in the capture area of the Pine Level/Keys Tract. The maximum influence was predicted to occur around 2055 based on the capture analysis. Similar to the average rainfall year scenario, annual average flow decreases by approximately 4 percent by 2055, dry season flow decreases by approximately 4 percent, and wet season flow increases by approximately 4 percent from 2009 levels.

TABLE 55

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 50 Percent in Big Slough Basin with the Pine Level/Keys Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	176	0%	95	0%	511	0%
2020	176	0%	95	0%	511	0%
2030	176	0%	95	0%	511	0%
2040	172	-3%	92	-3%	497	-3%
2050	172	-2%	92	-2%	498	-2%
	170	-4%	91	-4%	492	-4%
2060	171	-3%	92	-3%	494	-3%

To illustrate the effect on Big Slough Basin stream flow under the conditions and scenarios evaluated, the results are presented graphically and compared to the No Action Alternative conditions. Figures 66 and 67 present the seasonal and annual average flows calculated for Big Slough Basin with and without the Pine Level/Keys Tract based on 100 percent capture and 50 percent capture of stormwater, respectively, during average rainfall conditions.

FIGURE 66

Big Slough Basin Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without the Pine Level/Keys Tract

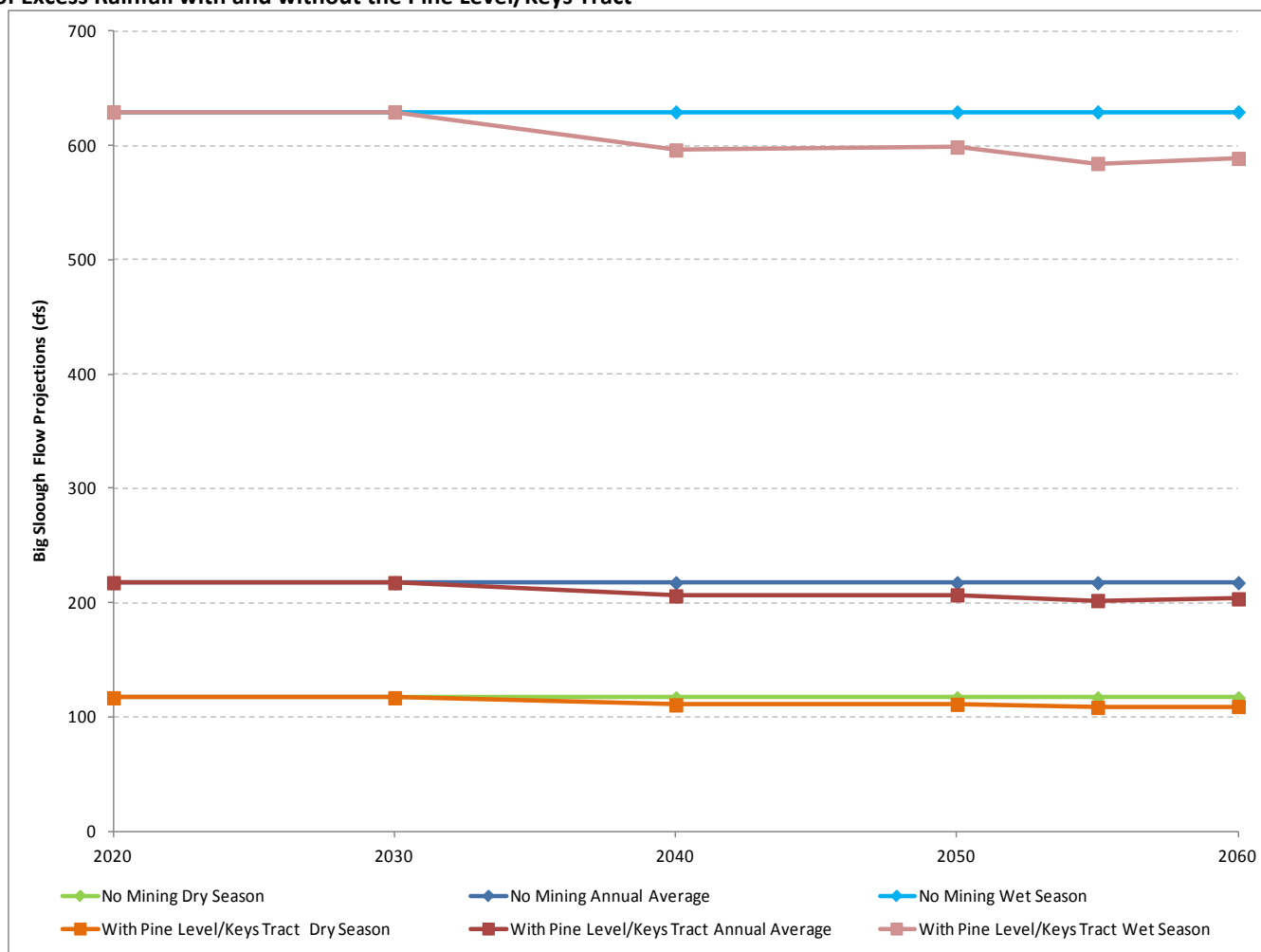
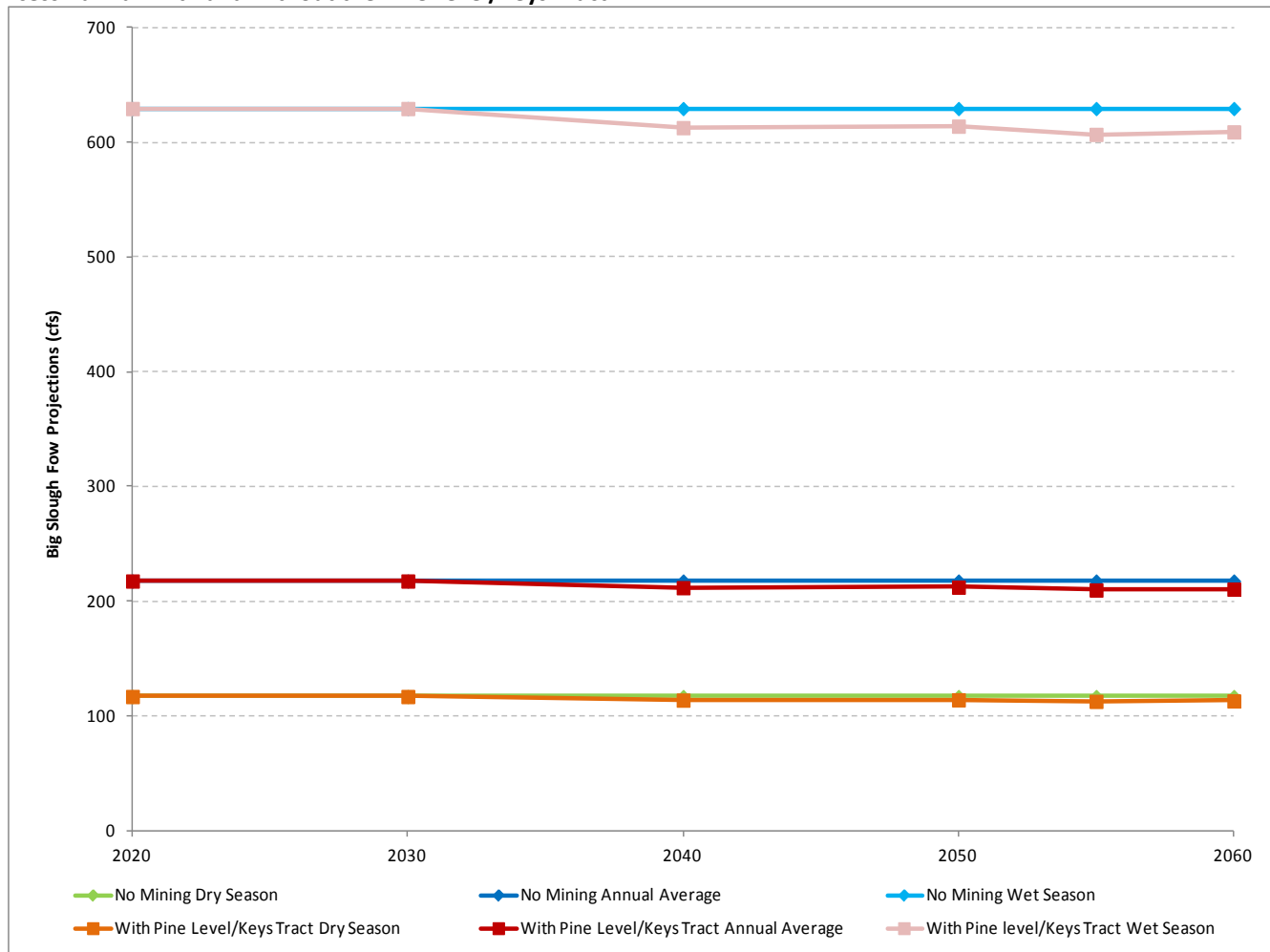


FIGURE 67

Big Slough Basin Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without the Pine Level/Keys Tract



The largest influence on annual average flow from the upper Myakka River subwatershed during average rainfall conditions is predicted to occur around 2055 based on the capture analysis. Based on 100 percent capture of stormwater, Big Slough Basin may have an average annual flow of approximately 217 cfs without the Pine Level/Keys Tract and approximately 202 cfs with the Pine Level/Keys Tract by 2055. Assuming a 50 percent capture of stormwater, Big Slough Basin may have an average annual flow of approximately 210 cfs. This corresponds to a decrease in flow of 7 cfs when compared to the No Action Alternative conditions.

Figures 68 and 69 present the seasonal and annual average flows calculated for Big Slough Basin with and without the Pine Level/Keys Tract based on 100 percent capture and 50 percent capture of stormwater, respectively, during low rainfall conditions.

FIGURE 68

Big Slough Basin Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without Pine Level/Keys Tract

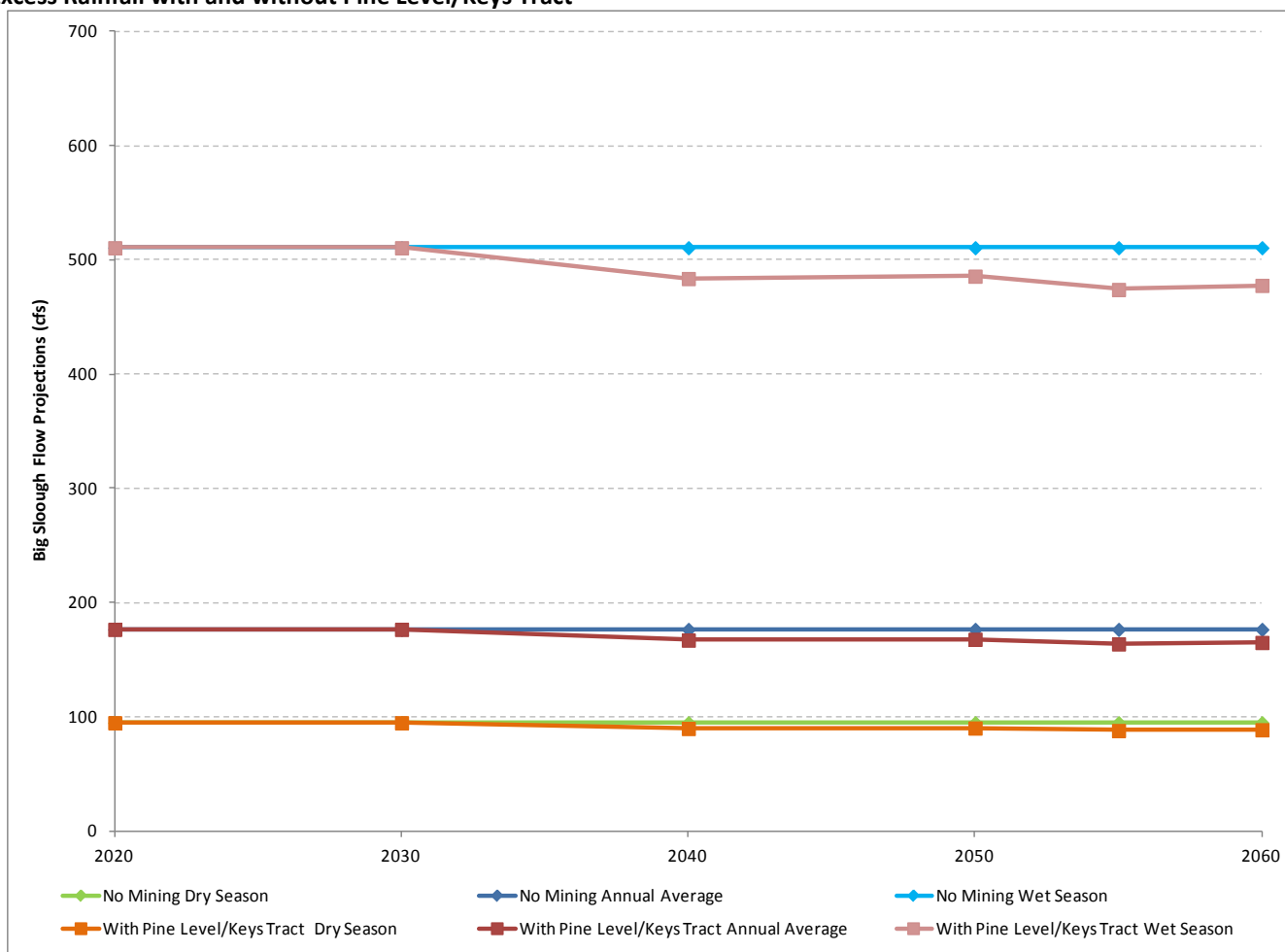
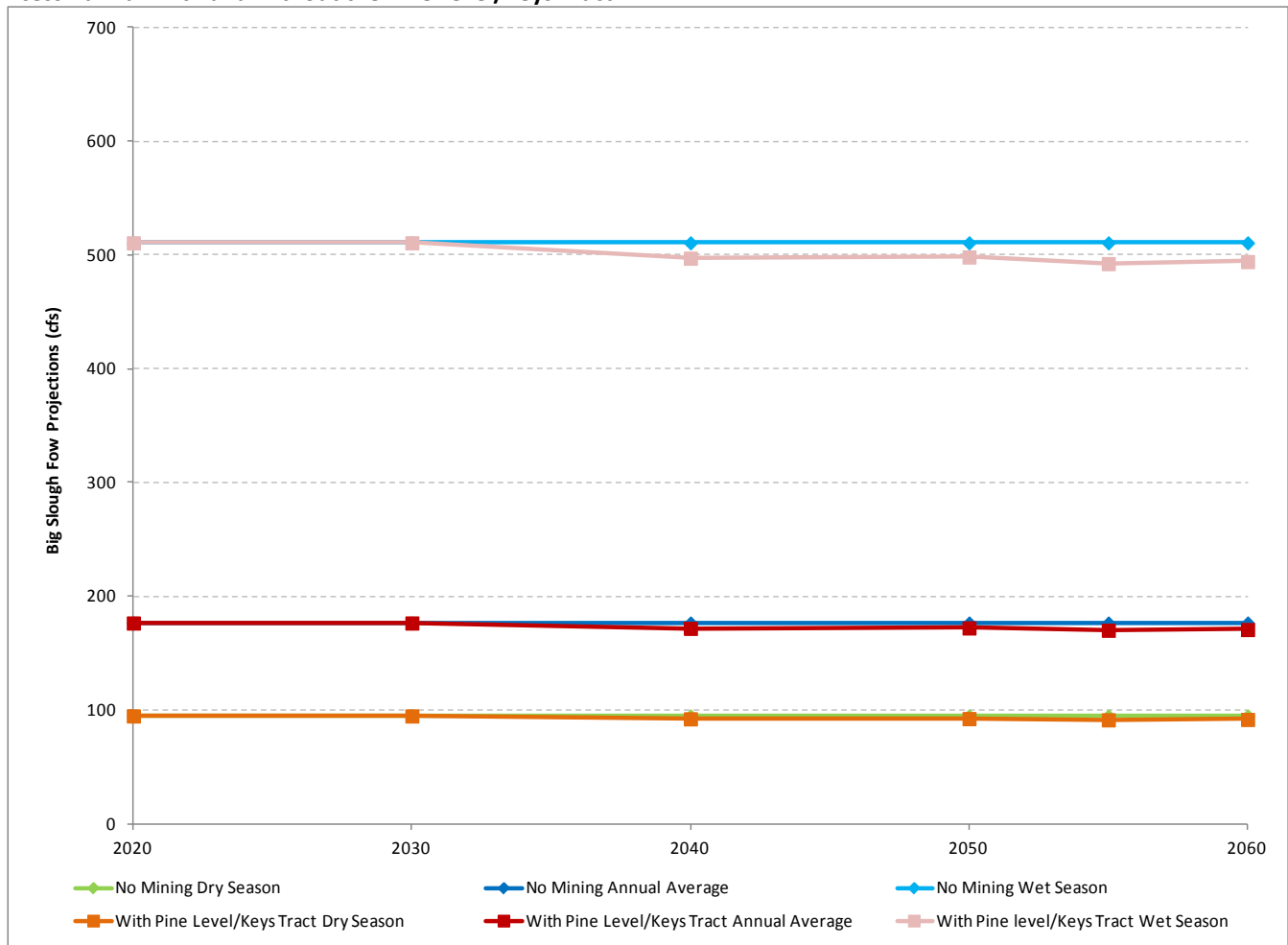


FIGURE 69

Big Slough Basin Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without the Pine Level/Keys Tract



Similar to average rainfall conditions, the largest influence on annual average flow from the Big Slough Basin during low rainfall conditions was predicted to occur around 2055 based on the capture analysis. Based on 100 percent capture of stormwater, the Big Slough Basin may have an average annual flow of approximately 176 cfs without the Pine Level/Keys Tract, and approximately 164 cfs with the Pine Level/Keys Tract by 2055. Assuming a 50 percent capture of stormwater, the Big Slough Basin may have an average annual flow of approximately 170 cfs. This corresponds to a decrease in flow of 6 cfs. The Pine Level/Keys Tract accounts for a small relative contribution to the flows in Big Slough Basin. The Pine Level/Keys Tract effects on flow quantities in Big Slough Basin would likely be relatively small, most perceptible during high flow periods, and projected far into the future. The SWFWMD plans to revisit the flows in this watershed in more detail after more data are collected near the City of North Port.

5.6.3 Pine Level/Keys Tract Year 2034 Implementation Effects on Horse Creek

Table 56 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 100 percent capture of stormwater in the capture area of the Pine Level/Keys Tract in Horse Creek subwatershed. The maximum influence was predicted to occur around 2050 according to the capture analysis. Annual average flow increases by approximately 1 percent by 2050, dry season flow increases less than 1 percent, and wet season flow increases by approximately 3 percent from 2009 levels. Eventually the areas mined would be reclaimed and these potential flow reductions during active mining returned to near pre-mining conditions, but that would occur beyond 2060.

TABLE 56

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 100 Percent Capture in Horse Creek Flow Station with the Pine Level/Keys Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	171	0%	78	0%	404	0%
2020	173	1%	78	0%	413	2%
2030	173	1%	78	0%	416	3%
2040	174	2%	78	<1%	419	3%
2050	173	1%	78	0%	416	3%
2060	175	2%	79	1%	421	4%

Table 57 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 50 percent capture of stormwater in the capture area of the Pine Level/Keys Tract in Horse Creek subwatershed. The maximum influence was predicted to occur around 2050 based on the capture analysis. Annual average flow increases by approximately 2 percent by 2050, dry season flow increases by approximately 1 percent, and wet season flow increases by approximately 4 percent from 2009 levels.

TABLE 57

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 50 Percent Capture in Horse Creek Flow Station with the Pine Level/Keys Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	171	0%	78	0%	404	0%
2020	173	1%	78	0%	413	2%
2030	173	1%	78	0%	416	3%
2040	174	2%	78	1%	416	3%
2050	174	2%	78	<1%	419	4%
2060	176	3%	79	2%	423	5%

The same evaluation was performed for a low rainfall year. Table 58 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 100 percent capture of stormwater in the capture area of the Pine Level/Keys Tract. The maximum influence was predicted to occur around 2050 based on the capture analysis. Annual average flow increases by approximately 2 percent by 2050, dry season flow increases by approximately 1 percent, and wet season flow increases by approximately 3 percent from 2009 levels.

TABLE 58

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 100 Percent Capture Horse Creek Flow Station with the Pine Level/Keys Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	84	0%	38	0%	199	0%
2020	85	1%	38	0%	203	2%
2030	85	1%	38	0%	205	3%
2040	86	2%	38	1%	206	3%
2050	85	1%	38	0%	204	3%
2060	86	2%	39	1%	207	4%

Table 59 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 50 percent capture of stormwater in the capture area of the Pine Level/Keys Tract. The maximum influence was predicted to occur around 2050 based on the capture analysis. Annual average flow increases by approximately 2 percent by 2050, dry season flow increases by approximately 1 percent, and wet season flow increases by approximately 4 percent from 2009 levels.

TABLE 59

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 50 Percent Horse Creek Flow Station with the Pine Level/Keys Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	84	0%	38	0%	199	0%
2020	85	1%	38	0%	203	2%
2030	85	1%	38	0%	205	3%
2040	85	2%	38	1%	205	3%
2050	86	2%	38	1%	206	4%
2060	86	3%	39	2%	208	5%

To illustrate the effect on Horse Creek subwatershed stream flow under the conditions and scenarios evaluated, the results are presented graphically and compared to the No Action Alternative conditions. Figures 70 and 71 present the seasonal and annual average flows calculated for Horse Creek subwatershed with and without the Pine Level/Keys Tract based on 100 percent capture and 50 percent capture of stormwater, respectively, during average rainfall conditions.

FIGURE 70

Horse Creek Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without the Pine Level/Keys Tract

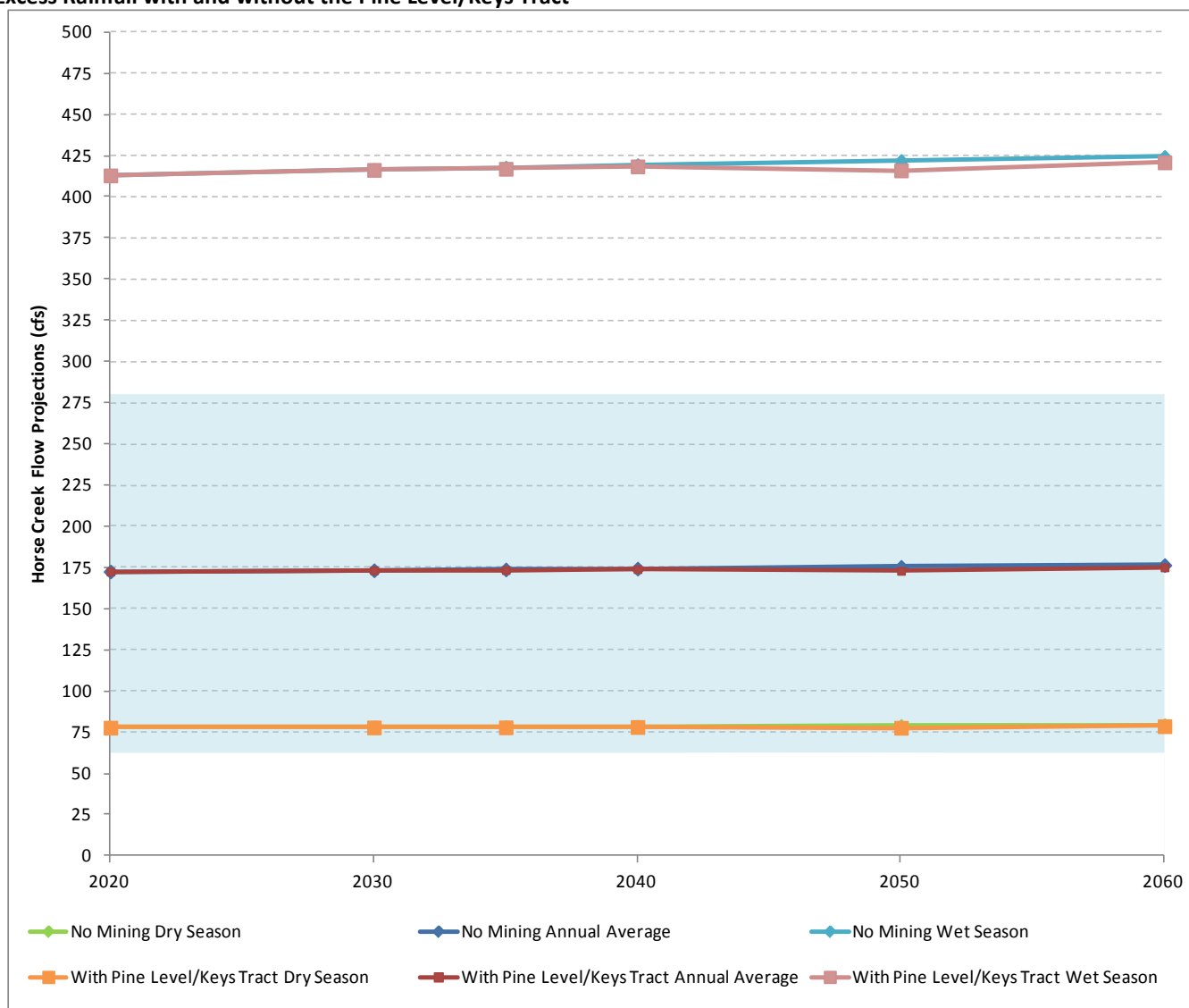
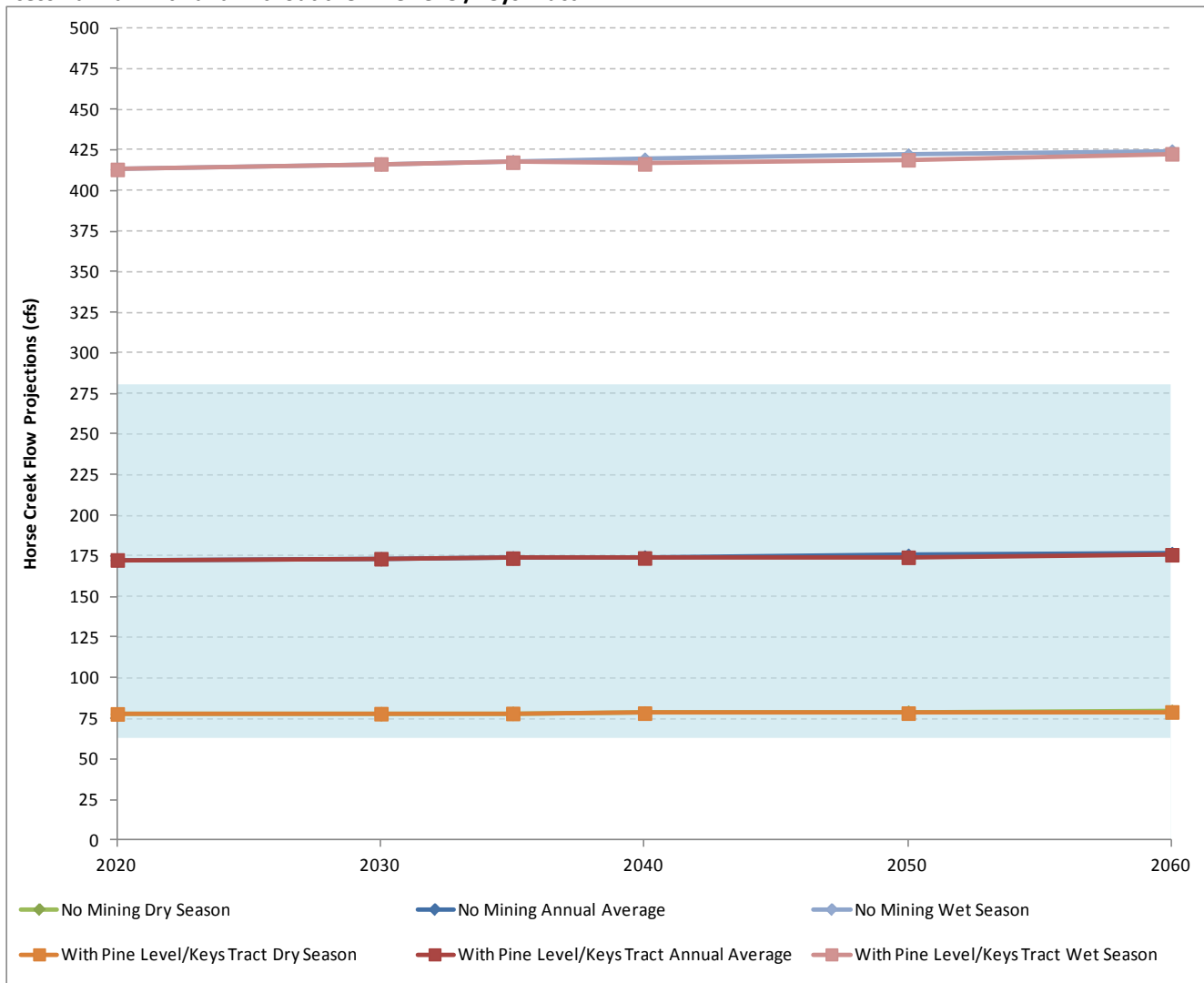


FIGURE 71

Horse Creek Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without the Pine Level/Keys Tract



The largest influence on annual average flow from the Horse Creek subwatershed during average rainfall conditions is predicted to occur 2050 based on the capture analysis. Based on 100 percent capture of stormwater, Horse Creek subwatershed may have an average annual flow of approximately 175 cfs without the Pine Level/Keys Tract and approximately 173 cfs with the Pine Level/Keys Tract during that period. Assuming a 50 percent capture of stormwater, Horse Creek subwatershed may have an average annual flow of approximately 174 cfs. This corresponds to a decrease in flow of 1 cfs when compared to the No Action Alternative conditions.

Figures 72 and 73 present the seasonal and annual average flows calculated for Horse Creek subwatershed with and without the Pine Level/Keys Tract based on 100 percent capture and 50 percent capture of stormwater, respectively, during low rainfall conditions.

FIGURE 72

Horse Creek Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without Pine Level/Keys Tract

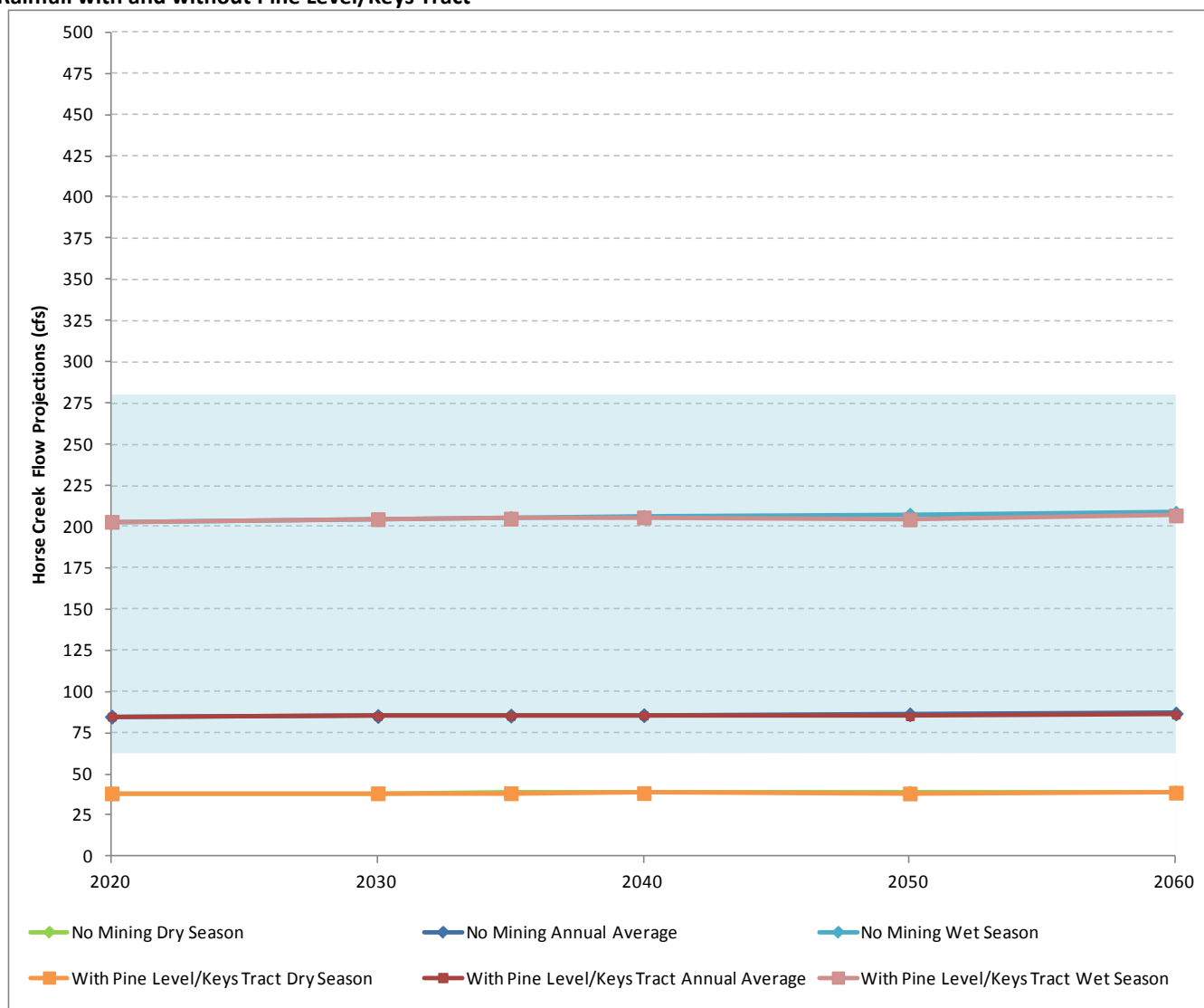
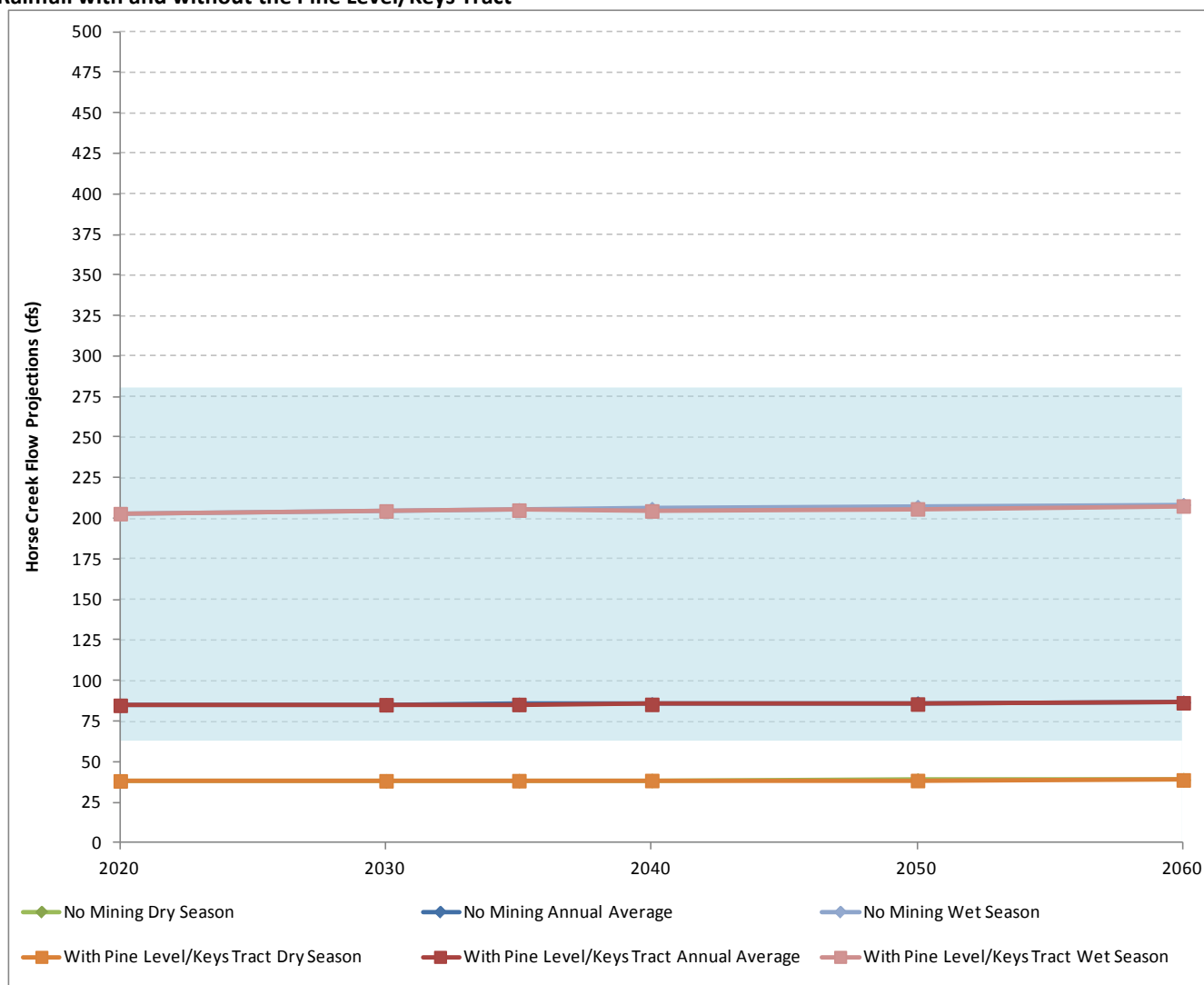


FIGURE 73

Horse Creek Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without the Pine Level/Keys Tract



Similar to average rainfall conditions, the largest influence on annual average flow from the Horse Creek subwatershed during low rainfall conditions was predicted to occur around 2040. Based on 100 percent capture of stormwater, the Horse Creek subwatershed may have an average annual flow of approximately 86 cfs without the Pine Level/Keys Tract, and approximately 85 cfs with the Pine Level/Keys Tract. Assuming a 50 percent capture of stormwater, the Horse Creek subwatershed may have an average annual flow of approximately 86 cfs. This corresponds to about the same flow when compared to No Action Alternative conditions.

5.7 Pioneer Offsite Alternative Impacts on Runoff Characteristics and Stream Flow

Pioneer Tract was also considered both as a stand-alone offsite alternative and as a reasonably foreseeable future action (as an extension to the Ona Mine), so two analyses were conducted. Again, the stand-alone alternative was assumed to start in 2025 even though its feasibility is unknown, and there will be some start-up issues to deal with like a new beneficiation plant and CSA, similar to any other new alternative that is not an extension or adjacent to another active mine. The future action is assumed to start in 2048. Each separate analysis, stand-alone and extension, are presented below.

5.7.1 Pioneer Tract Alternative Year 2025 Implementation

As with the previous alternatives where the footprint lies in different subwatersheds, the analysis provides the results by subwatershed. The impacts of this alternative on surface water runoff potential were calculated by evaluating the change to the runoff coefficients in the Horse Creek and the Peace River at Arcadia subwatersheds.

5.7.1.1 Pioneer Tract Year 2025 Implementation Effects on Horse Creek

Table 60 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 100 percent capture of stormwater in the capture area of the Pioneer Tract at the Horse Creek flow station (near Arcadia). The maximum influence (i.e., largest capture area) was predicted to occur around 2050. Flows in Horse Creek are predicted to increase based on land use changes alone. Annual average flow decreases by approximately 3 percent by 2050, dry season flow decreases by approximately 4 percent, and wet season flow decreases by approximately 1 percent when compared to 2009 flows. Flow is expected to return to near No Action Alternative conditions by 2060 and is slightly higher than 2009 flow because of changes to land use.

TABLE 60

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 100 Percent Capture at the Horse Creek Flow Station with the Pioneer Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	171	0%	78	0%	404	0%
2020	173	1%	78	0%	413	2%
2030	170	-1%	76	-2%	408	1%
2040	169	-1%	76	-2%	407	1%
2050	165	-3%	75	-4%	400	-1%
2060	174	2%	78	1%	418	3%

Table 61 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 50 percent capture of stormwater in the capture area of the Pioneer Tract at the Horse Creek flow station. By 2050 the annual average flow with the Pioneer Tract remains about the same as the 2009 flow after accounting for increases from land use, dry season flow decreases by approximately 1 percent, and wet season flow increases by 2 percent from 2009 levels.

TABLE 61

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 50 Percent Capture at the Horse Creek Flow Station with the Pioneer Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	171	0%	78	0%	404	0%
2020	173	1%	78	0%	413	2%
2030	172	<1%	77	-1%	412	2%
2040	172	1%	77	-1%	413	2%
2050	171	0%	77	-1%	411	2%
2060	175	2%	79	1%	421	4%

The same evaluation was performed for a low rainfall year. Table 62 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 100 percent capture of stormwater in the capture area of the Pioneer Tract at the Horse Creek flow station. Similar to the average rainfall conditions evaluation, annual average flow does not change by much. The average annual flow decreases by approximately 3 percent by 2050, dry season flows decrease by 4 percent, and wet season flow decreases by approximately 1 percent from when compared to 2009 flows. The flows recover after 2050 to a level that is slightly higher than the 2009 levels resulting from land use change. All differences in this case are only a few cfs.

TABLE 62

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 100 Percent Capture at the Horse Creek Flow Station with the Pioneer Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	84	0%	38	0%	199	0%
2020	85	1%	38	0%	203	2%
2030	83	-1%	38	-2%	201	1%
2040	83	-1%	37	-2%	200	1%
2050	82	-3%	37	-4%	197	-1%
2060	85	2%	38	1%	205	3%

Table 63 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 50 percent capture of stormwater in the capture area of the Pioneer Tract at the Horse Creek flow station. By 2050 the annual average flow remains about the same, dry season flow decreases by approximately 1 percent or less, and wet season flow increases by approximately 1 percent from 2009 flows.

TABLE 63

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 50 Percent Capture at the Horse Creek Flow Station with the Pioneer Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	84	0%	38	0%	199	0%
2020	85	1%	38	0%	203	2%
2030	84	0%	38	<-1%	203	2%
2040	84	<1%	38	<-1%	203	2%
2050	84	0%	38	<-1%	202	2%
2060	86	2%	39	1%	207	4%

To illustrate the effect on Horse Creek stream flow under the conditions and scenarios evaluated, the results are presented graphically and compared to the No Action Alternative conditions. Figures 74 and 75 present the seasonal and annual average flows calculated for the Horse Creek gage station with and without the Pioneer Tract based on 100 percent capture and 50 percent capture of stormwater, respectively, during average rainfall conditions.

FIGURE 74

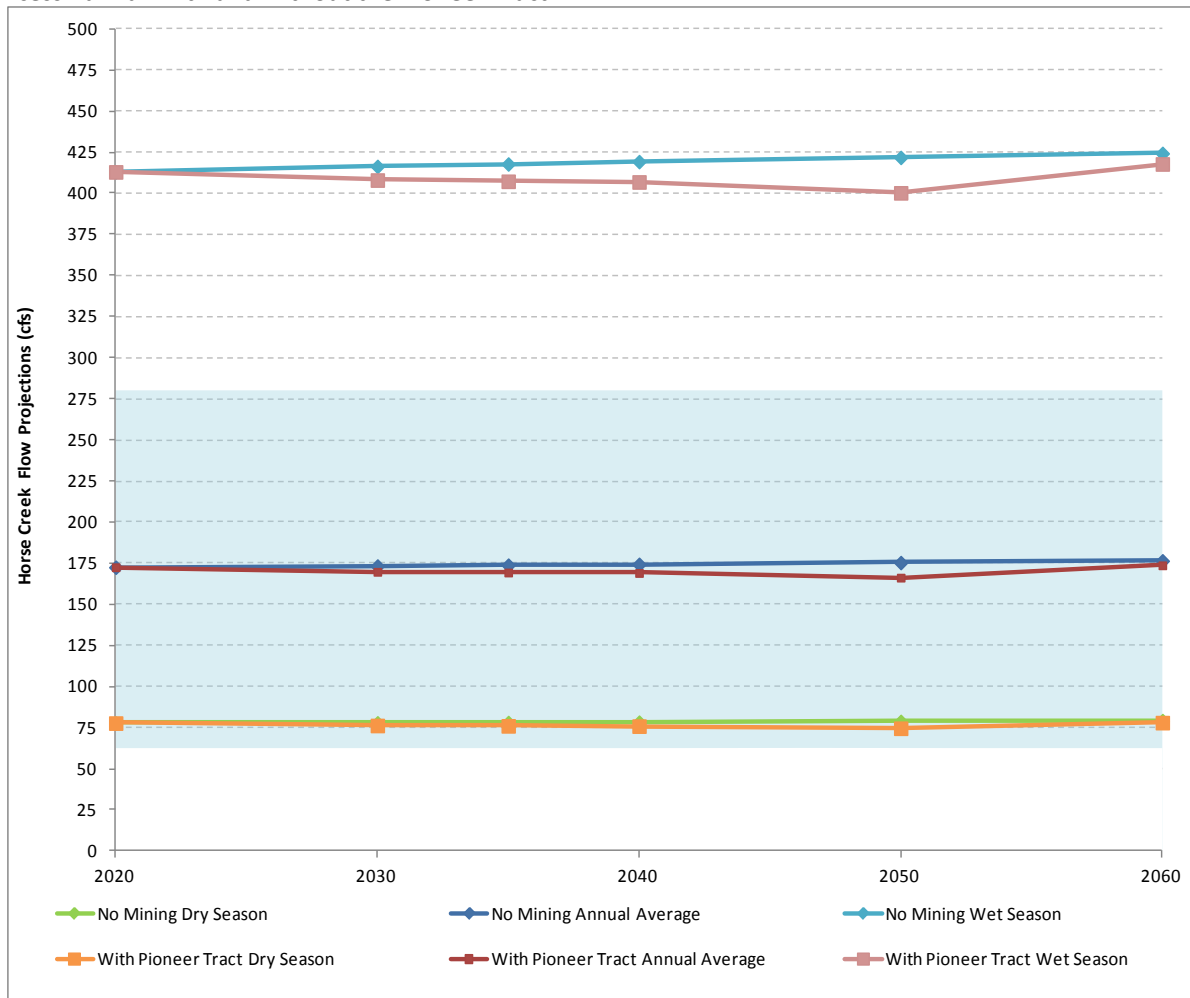
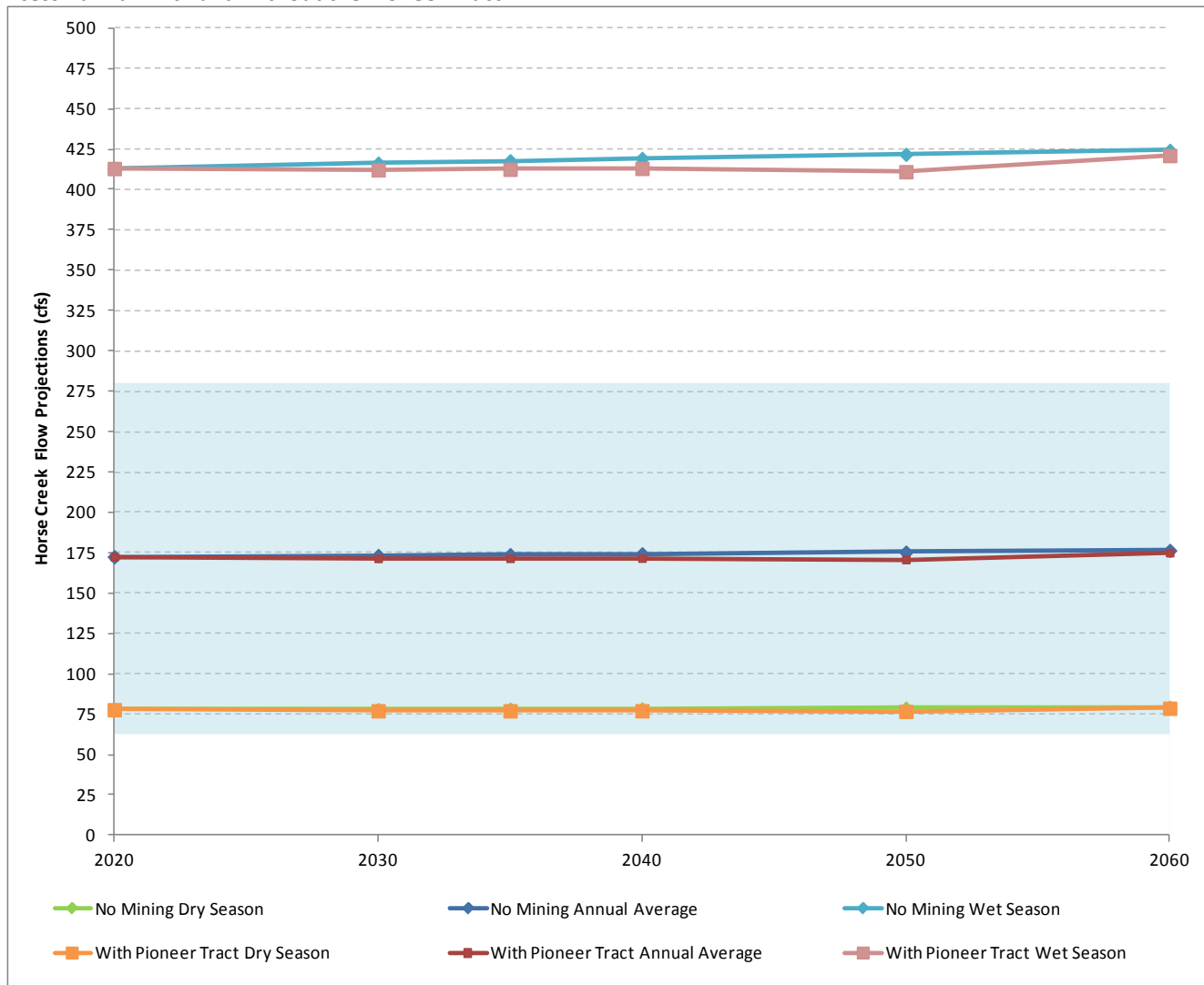
Horse Creek Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without the Pioneer Tract

FIGURE 75

Horse Creek Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without the Pioneer Tract



Based on 100 percent capture of stormwater, Horse Creek may have an average annual flow of approximately 175 cfs without the Pioneer Tract and approximately 166 cfs with the Pioneer Tract by 2050. Assuming a 50 percent capture of stormwater, Horse Creek may have an average annual flow of approximately 171 cfs by 2050. This corresponds to a decrease in flow of about 4 cfs when compared to the No Action Alternative conditions.

Figures 76 and 77 present the seasonal and annual average flows calculated for the Horse Creek gage station with and without the Pioneer Tract based on 100 percent capture and 50 percent capture of stormwater, respectively, during low rainfall conditions.

FIGURE 76

Horse Creek Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without the Pioneer Tract

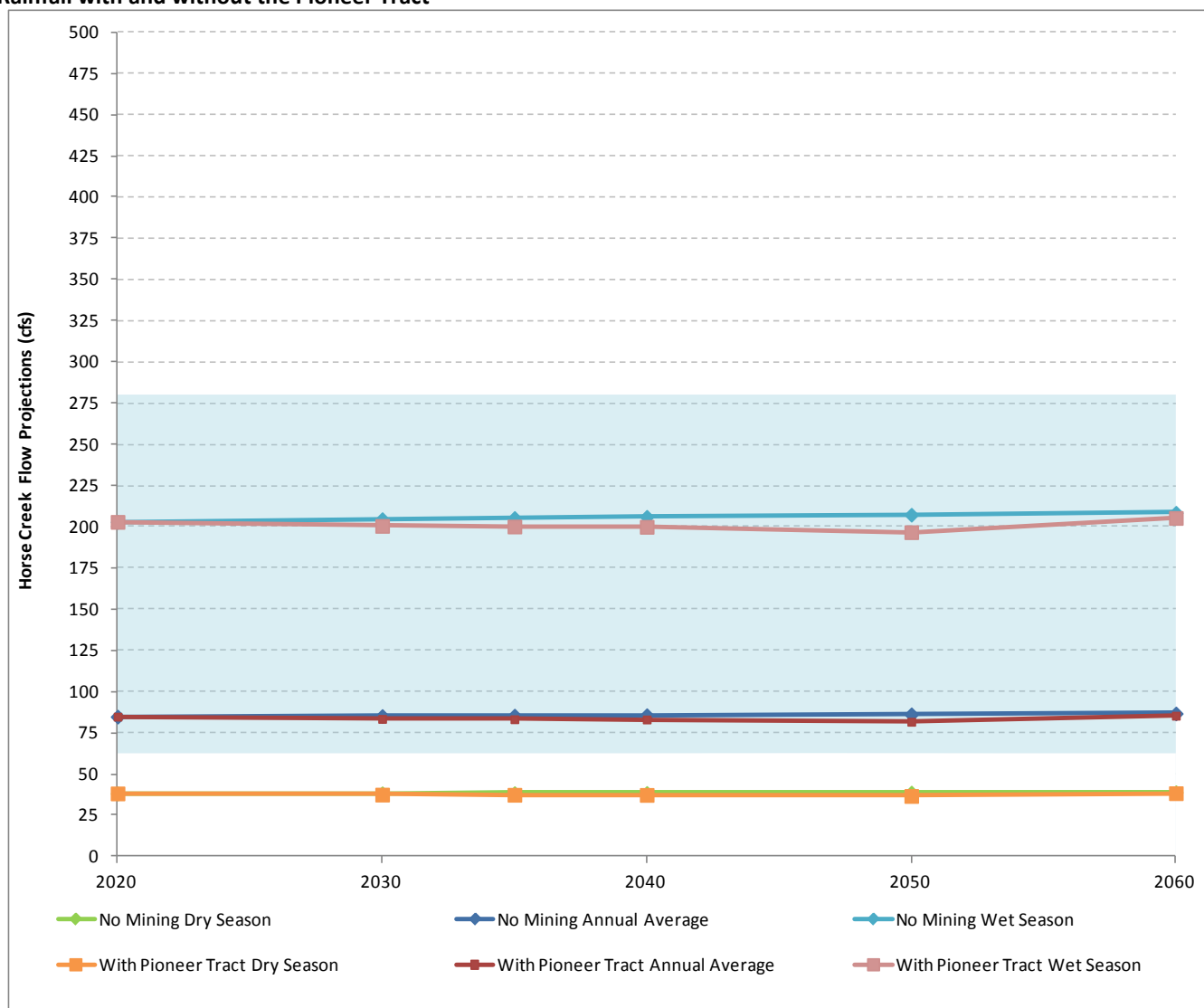
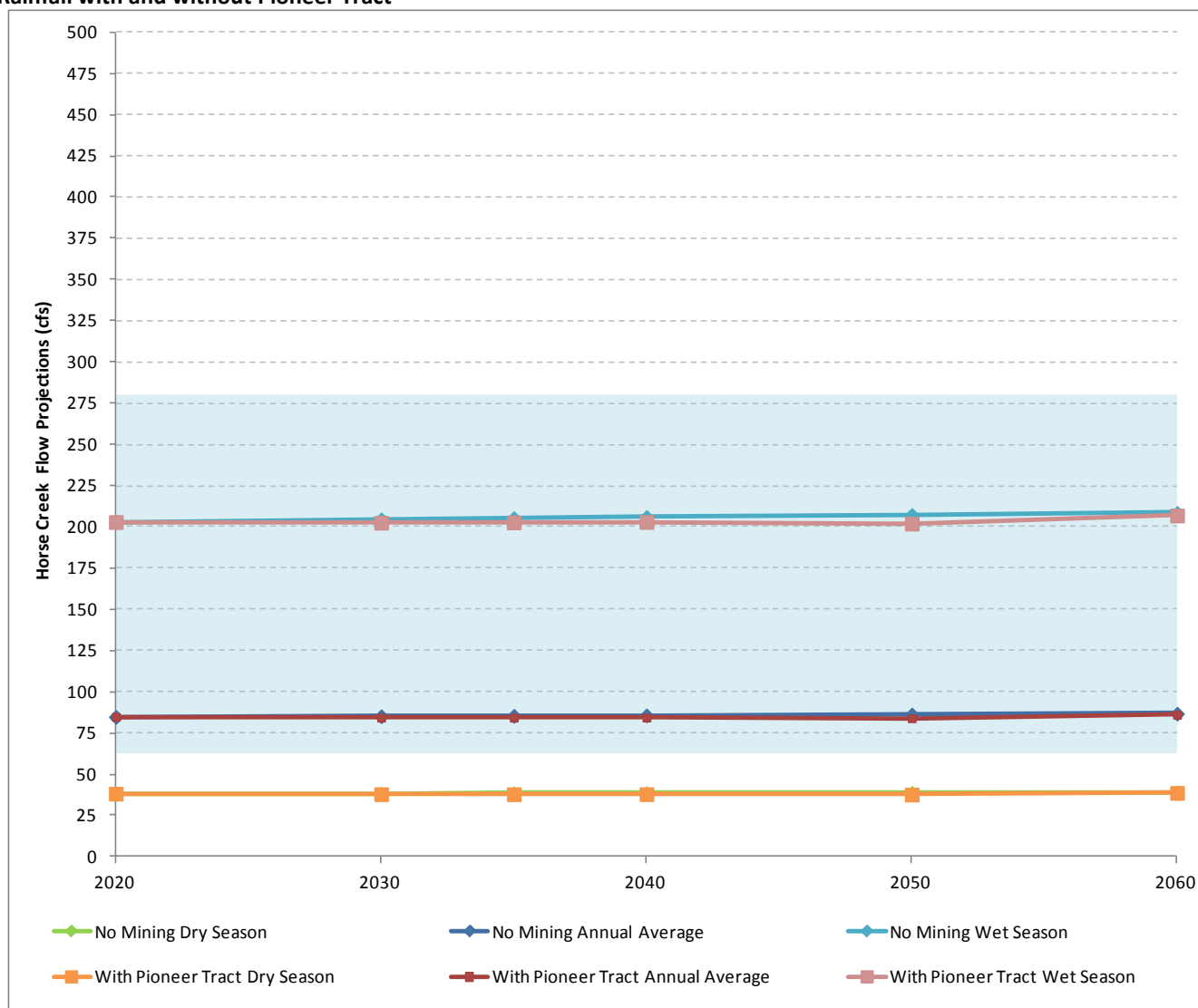


FIGURE 77

Horse Creek Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without Pioneer Tract

Based on 100 percent capture of stormwater, Horse Creek may have an average annual flow of approximately 86 cfs by 2050 without the Pioneer Tract and approximately 82 cfs with the Pioneer Tract. Assuming a 50 percent capture of stormwater, Horse Creek may have an average annual flow of approximately 84 cfs by 2050. This corresponds to a decrease in flow of 2 cfs when compared to the No Action Alternative conditions.

5.7.1.2 Pioneer Tract Year 2025 Implementation Effects on Peace River at Arcadia

Table 64 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 100 percent capture of stormwater in the capture area of the Pioneer Tract at the Peace River at Arcadia station. The maximum impact in the Peace River at Arcadia subwatershed occurs around 2040 according to the capture curve, sooner than in Horse Creek subwatershed. Based on projected land use changes within the subwatershed and upstream subwatersheds, flows are predicted to increase during the Pioneer Tract mining period through 2060. By 2040 the annual average flow increases by approximately 5 percent, dry season flow increases by approximately 4 percent, and wet season flow increases by approximately 7 percent from 2009 levels. Considering the small percentage of land that would be mined compared to the total drainage area of this gage station, the changes in projected land use are predicted to have more of an effect on flow than the Pioneer Tract stormwater capture.

TABLE 64

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 100 Percent Capture at the Peace River at Arcadia Flow Station with the Pioneer Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	713	0%	328	0%	1,657	0%
2020	726	2%	332	1%	1,702	3%
2030	734	3%	334	2%	1,734	5%
2040	749	5%	340	4%	1,773	7%
2050	768	8%	348	6%	1818	10%
2060	782	10%	355	8%	1,856	12%

Table 65 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 50 percent capture of stormwater in the capture area of the Pioneer Tract at the Peace River at Arcadia gage station. Similar to the 100 percent capture case, based on land use changes within the subwatershed and upstream subwatersheds, flows are predicted to increase during the Pioneer Tract mining period in excess of any impact. Annual average flow increases by approximately 5 percent by 2040, dry season flow increases by approximately 4 percent, and wet season flow increases by approximately 7 percent from 2009 levels.

TABLE 65

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 50 Percent Capture at the Peace River at Arcadia Flow Station with the Pioneer Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	713	0%	328	0%	1,657	0%
2020	726	2%	332	1%	1,702	3%
2030	736	3%	335	2%	1,738	5%
2040	752	5%	341	4%	1,779	7%
2050	770	8%	349	7%	1,824	10%
2060	783	10%	355	8%	1,857	12%

The same evaluation was performed for a low rainfall year. Table 66 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 100 percent capture of stormwater in the capture area of the Pioneer Tract. Flows are predicted to increase from 2009 levels by approximately 10 percent by 2060. Annual average flow increases by approximately 5 percent by 2040, dry season flow increases by approximately 4 percent, and wet season flow increases by approximately 7 percent from 2009 levels.

TABLE 66

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 100 Percent Capture at the Peace River at Arcadia Flow Station with the Pioneer Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	330	0%	152	0%	766	0%
2020	337	2%	154	1%	787	3%
2030	340	3%	155	2%	803	5%
2040	347	5%	158	4%	822	7%
2050	356	8%	162	7%	844	10%
2060	363	10%	165	8%	861	12%

Table 67 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 50 percent capture of stormwater in the capture area of the Pioneer Tract. Similar to the average rainfall year scenario, based on projected land use changes within the subwatershed and upstream subwatersheds, flows are predicted to increase during the Pioneer Tract mining period through 2060. Annual average flow increases by approximately 6 percent by 2040, dry season flow increases by approximately 4 percent, and wet season flow increases by approximately 8 percent from 2009 levels.

TABLE 67

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 50 Percent Capture at the Peace River at Arcadia Flow Station with the Pioneer Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	330	0%	152	0%	766	0%
2020	337	2%	154	1%	787	3%
2030	341	3%	155	2%	805	5%
2040	349	6%	158	4%	825	8%
2050	357	8%	162	7%	846	10%
2060	363	10%	165	9%	861	12%

To illustrate the effect on Peace River at Arcadia stream flow under the conditions and scenarios evaluated, the results are presented graphically and compared to the No Action Alternative conditions. Figures 78 and 79 present the seasonal and annual average flows calculated for the Peace River at Arcadia gage station with and without the Pioneer Tract based on 100 percent capture and 50 percent capture of stormwater, respectively, during average rainfall conditions.

FIGURE 78

Peace River at Arcadia Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without the Pioneer Tract

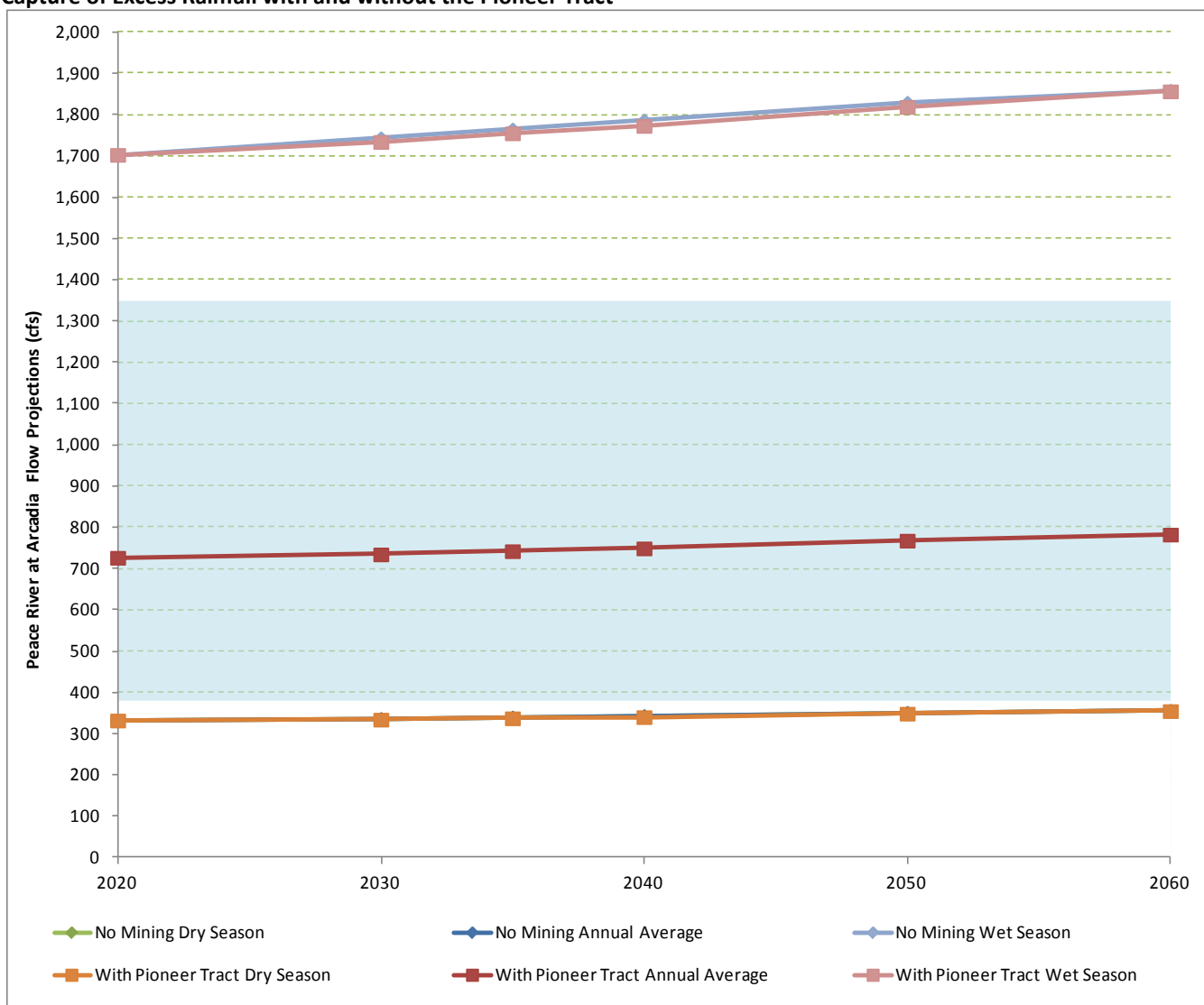
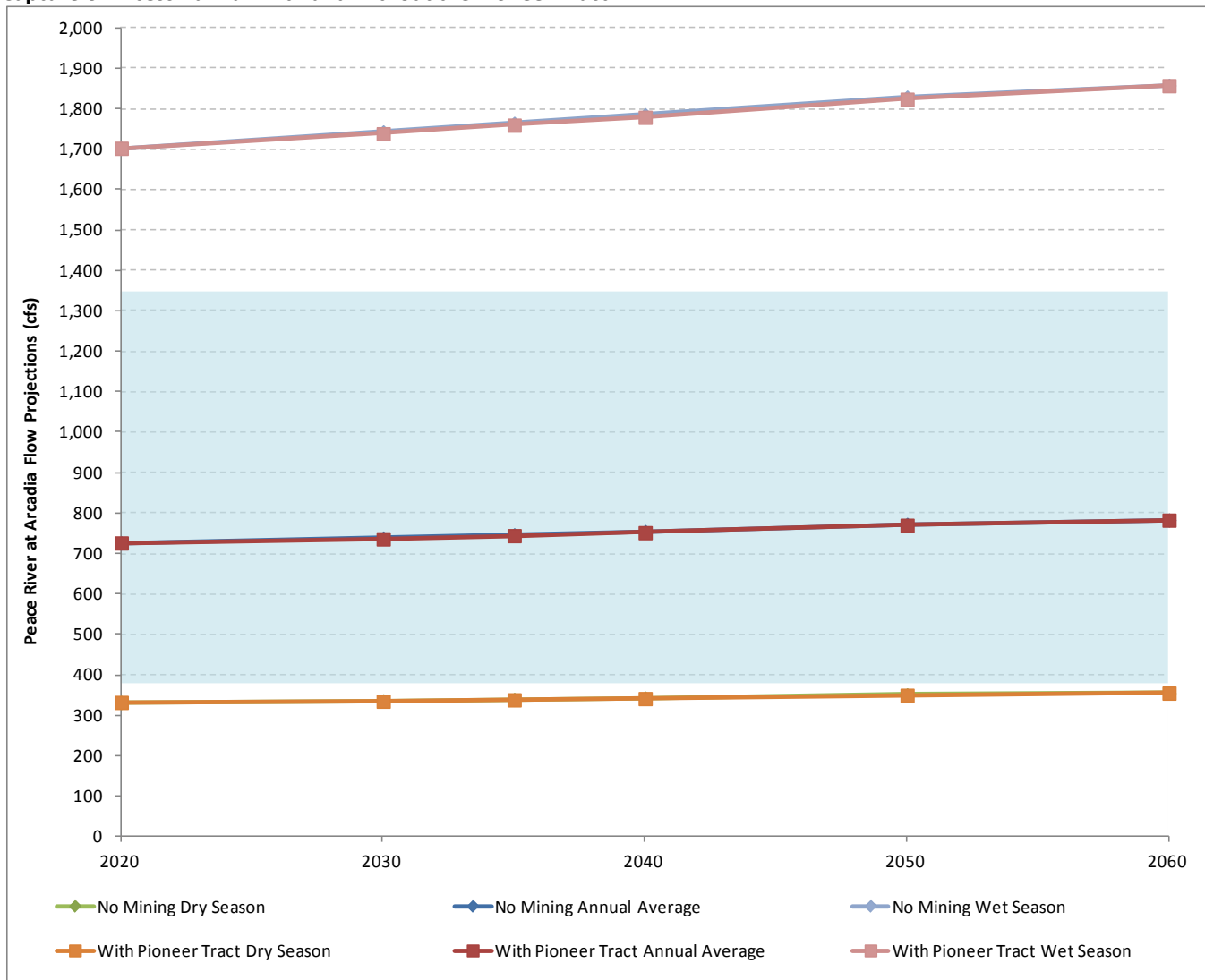


FIGURE 79

Peace River at Arcadia Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without the Pioneer Tract



The largest influences on annual average flow from the Peace River at Arcadia subwatershed during average rainfall conditions were predicted around 2040 based on the capture analysis. Based on 100 percent capture of stormwater, Peace River at Arcadia may have an average annual flow of approximately 754 cfs by 2040 without the Pioneer Tract and approximately 749 cfs with the Pioneer Tract. Reductions in flow resulting from mine capture are expected to be less than the anticipated flow increases associated with projected changes in land use. Assuming a 50 percent capture of stormwater, Peace River at Arcadia may have an average annual flow of approximately 752 cfs. This corresponds to a decrease in flow of 2 cfs when compared to the No Action Alternative conditions, which is negligible.

Figures 80 and 81 present the seasonal and annual average flows calculated for the Peace River at Arcadia gage station with and without the Pioneer Tract based on 100 percent capture and 50 percent capture of stormwater, respectively, during low rainfall conditions.

FIGURE 80

Peace River at Arcadia Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without the Pioneer Tract

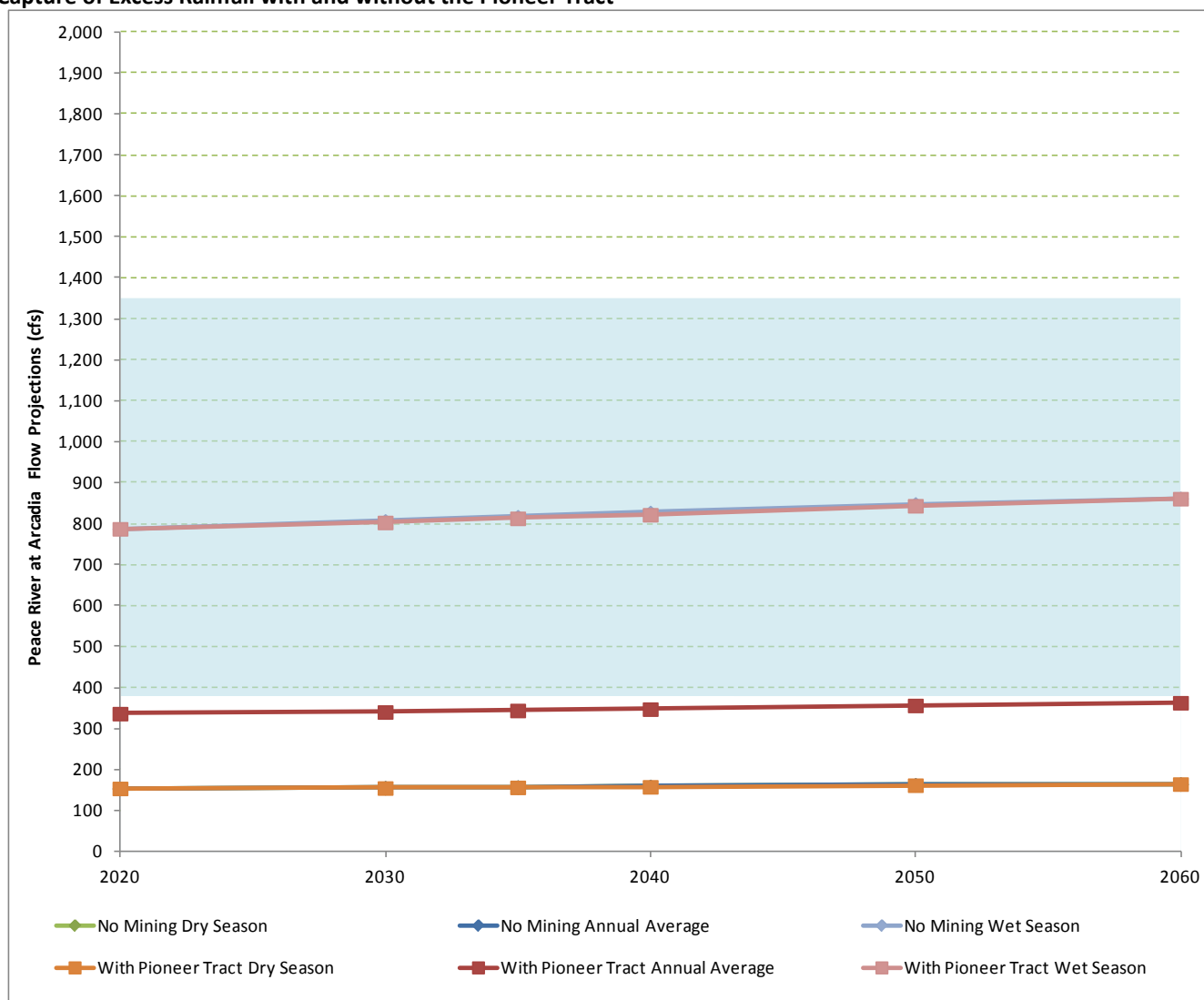
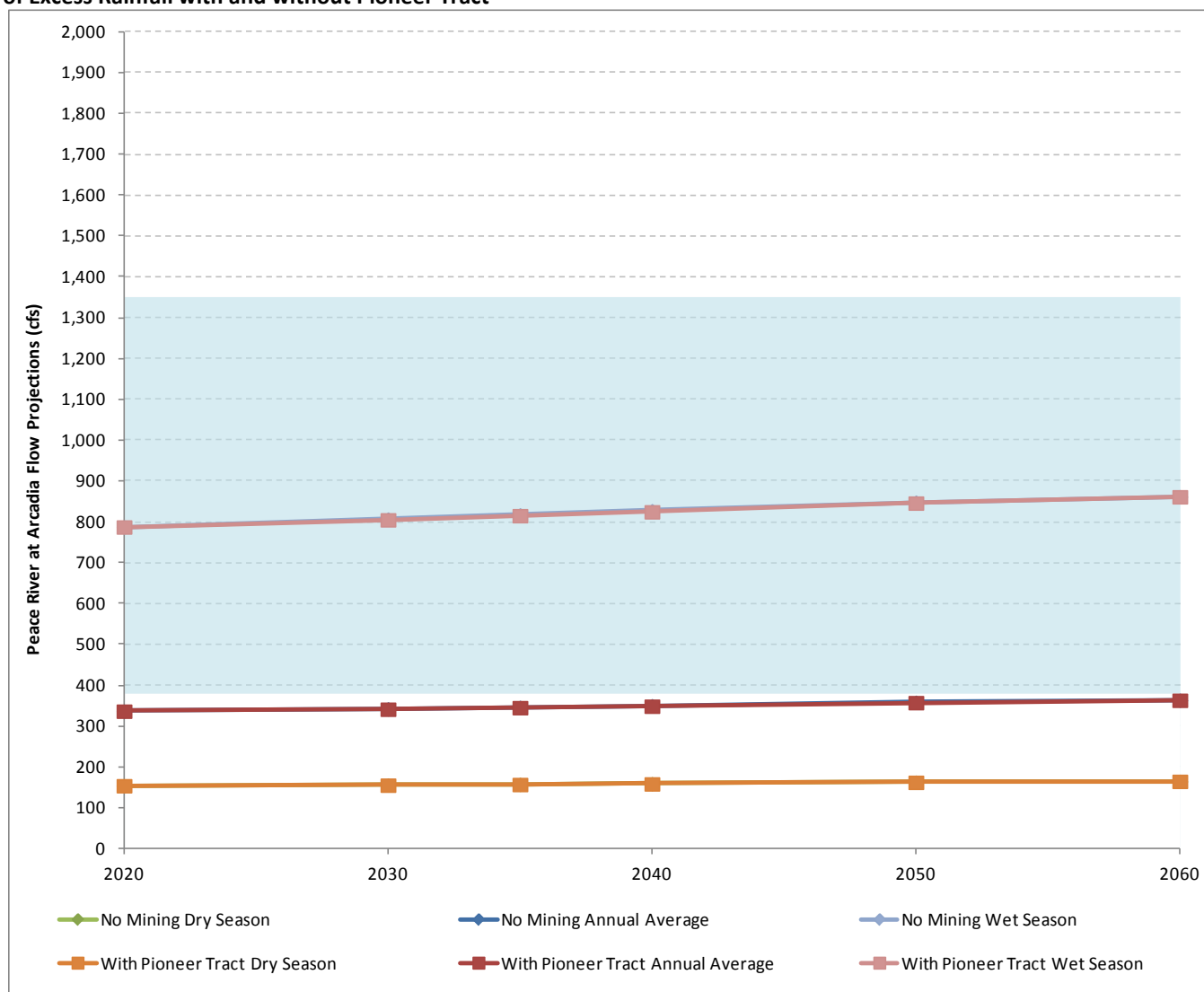


FIGURE 81

Peace River at Arcadia Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without Pioneer Tract



Results of the low rainfall year were similar to average rainfall conditions. Based on 100 percent capture of stormwater, Peace River at Arcadia may have an average annual flow of approximately 350 cfs by 2040 without the Pioneer Tract and approximately 347 cfs with the Pioneer Tract. Assuming a 50 percent capture of stormwater, Peace River at Arcadia may have an average annual flow of approximately 349 cfs, nearly identical to the No Action Alternative conditions.

The Pioneer Tract has a small relative contribution to the flows measured at the Peace River at Arcadia gage station because of its relative size. The Pioneer Tract impact on flow quantities at this station would likely not be perceivable, particularly since flows are expected to increase as a result of projected land use changes in the Peace River at Arcadia drainage area.

5.7.2 Pioneer Tract Alternative Year 2048 Implementation

As a reasonably foreseeable future action, Pioneer Tract would be an extension to the Ona Mine. It is estimated that mining at this alternative would not begin until 2048. While evaluated separately, the impacts are expected to be a continuation of the Ona Mine in time.

5.7.2.1 Pioneer Tract Year 2048 Implementation Effects on Horse Creek

Table 68 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 100 percent capture of stormwater in the capture area of the Pioneer Tract at the Horse Creek flow station (near Arcadia). The maximum influence (i.e., largest capture area) was predicted to occur around 2070, further in the future than the extent of this analysis. Therefore, the expected conditions for 2060 are discussed for this evaluation. Flows in Horse Creek are predicted to increase based on land use changes alone. The flow decreases projected to occur resulting from Pioneer Tract impacts are projected to be less than the increase in flow resulting from projected land use changes since 2009. Annual average flow increases by approximately 1 percent, dry season flow decreases by approximately less than 1 percent, and wet season flow increases by approximately 2 percent when compared to 2009 flows.

TABLE 68

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 100 Percent Capture at the Horse Creek Flow Station with the Pioneer Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	171	0%	78	0%	404	0%
2020	173	1%	78	0%	413	2%
2030	173	1%	78	0%	416	3%
2040	174	2%	78	1%	419	4%
2050	174	2%	78	1%	418	3%
2060	172	1%	77	0%	414	2%

Table 69 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 50 percent capture of stormwater in the capture area of the Pioneer Tract at the Horse Creek flow station. Similar to the 100 percent capture analysis, annual average flow increases by approximately 2 percent, dry season flow increases by approximately 1 percent, and wet season flow increases by 4 percent from 2009 levels. When considering only the Pioneer Tract, changes in land use within this watershed result in the annual average flow increasing when compared to 2009 flow even when the capture area associated with the Pioneer Tract is included.

TABLE 69

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 50 Percent Capture at the Horse Creek Flow Station with the Pioneer Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	171	0%	78	0%	404	0%
2020	173	1%	78	0%	413	2%
2030	173	1%	78	0%	416	3%
2040	174	2%	78	<1%	419	4%
2050	175	2%	78	<1%	420	4%
2060	174	2%	78	<1%	419	4%

The same evaluation was performed for a low rainfall year. Table 70 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 100 percent capture of stormwater in the capture area of the Pioneer Tract at the Horse Creek flow station. Similar to the average rainfall conditions evaluation, annual average flow increases by approximately 1 percent, dry season flows remain approximately the same, and wet season flow increases by approximately 2 percent from when compared to 2009 flows.

TABLE 70

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 100 Percent Capture at the Horse Creek Flow Station with the Pioneer Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	84	0%	38	0%	199	0%
2020	85	1%	38	0%	203	2%
2030	85	1%	38	0%	205	3%
2040	86	2%	39	1%	206	4%
2050	85	2%	38	<11%	205	3%
2060	85	1%	38	0%	203	2%

Table 71 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 50 percent capture of stormwater in the capture area of the Pioneer Tract at the Horse Creek flow station. Annual average flow increases by approximately 2 percent, dry season flow increases by approximately 1 percent, and wet season flow increases by approximately 4 percent from 2009 flows.

TABLE 71

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 50 Percent Capture at the Horse Creek Flow Station with the Pioneer Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	84	0%	38	0%	199	0%
2020	85	1%	38	0%	203	2%
2030	85	1%	38	0%	205	3%
2040	86	2%	39	1%	206	4%
2050	86	2%	39	1%	206	4%
2060	86	2%	38	<1%	206	4%

To illustrate the effect on Horse Creek stream flow under the conditions and scenarios evaluated, the results are presented graphically and compared to the No Action Alternative conditions. Figures 82 and 83 present the seasonal and annual average flows calculated for the Horse Creek gage station with and without the Pioneer Tract based on 100 percent capture and 50 percent capture of stormwater, respectively, during average rainfall conditions.

FIGURE 82

Horse Creek Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without the Pioneer Tract

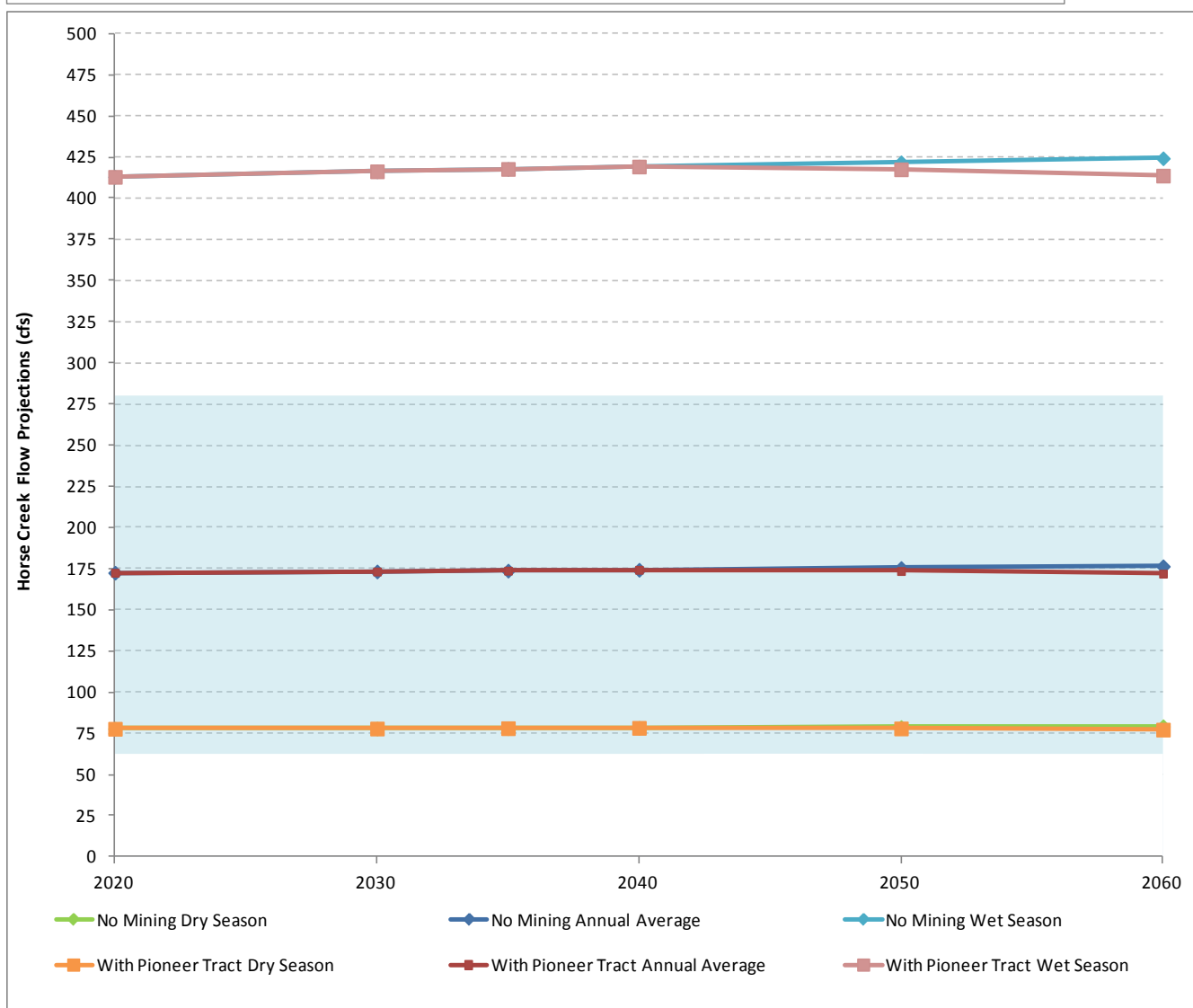
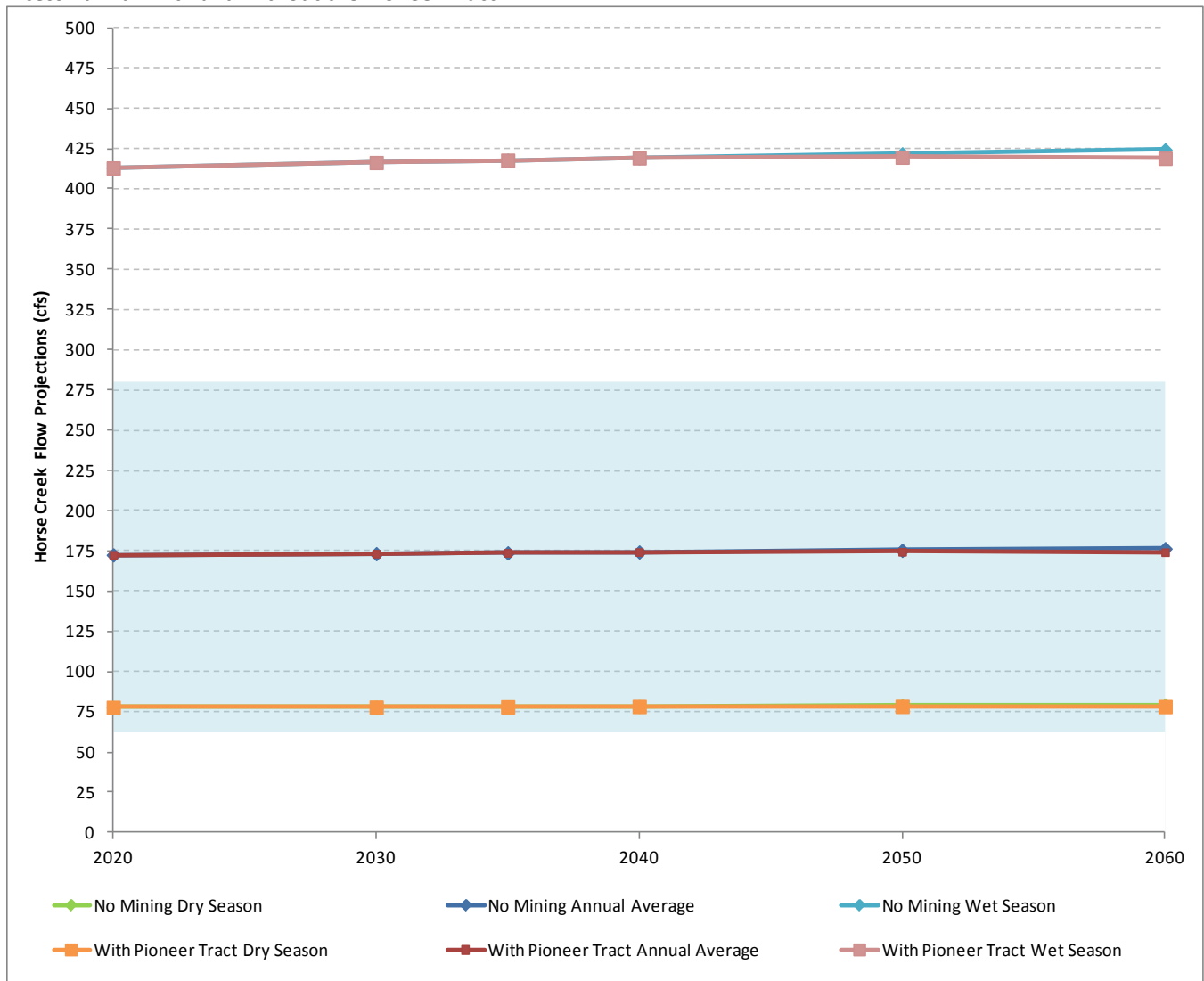


FIGURE 83

Horse Creek Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without the Pioneer Tract

Based on 100 percent capture of stormwater, Horse Creek may have an average annual flow of approximately 177 cfs without the Pioneer Tract and approximately 172 cfs with the Pioneer Tract by 2060. Assuming a 50 percent capture of stormwater, Horse Creek may have an average annual flow of approximately 174 cfs by 2060. This corresponds to a decrease in flow of 3 cfs when compared to the No Action Alternative conditions.

Figures 84 and 85 present the seasonal and annual average flows calculated for the Horse Creek gage station with and without the Pioneer Tract based on 100 percent capture and 50 percent capture of stormwater, respectively, during low rainfall conditions.

FIGURE 84

Horse Creek Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without the Pioneer Tract

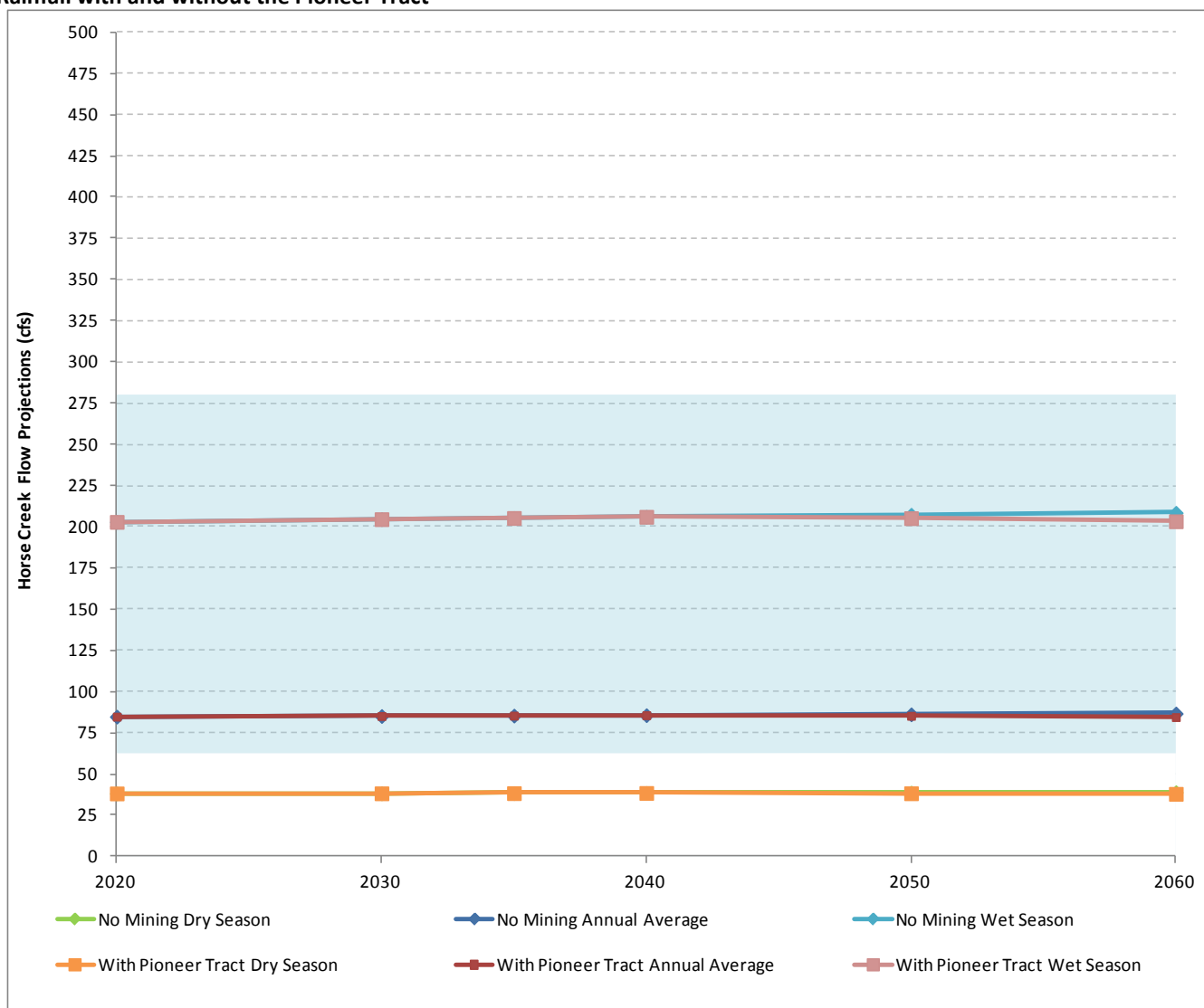
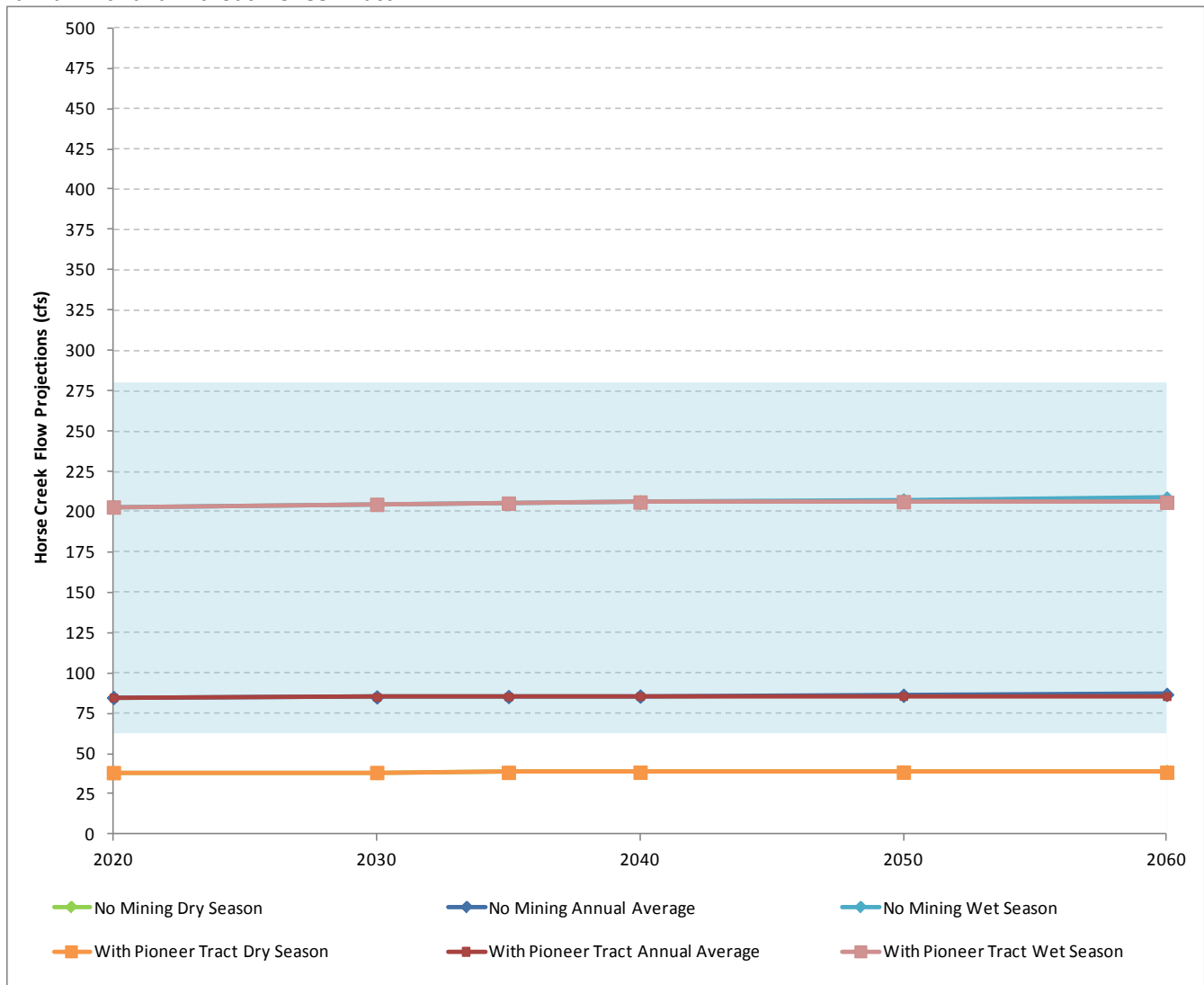


FIGURE 85

Horse Creek Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without Pioneer Tract

Based on 100 percent capture of stormwater, Horse Creek may have an average annual flow of approximately 87 cfs without the Pioneer Tract and approximately 85 cfs with the Pioneer Tract by 2060. Assuming a 50 percent capture of stormwater, Horse Creek may have an average annual flow of approximately 86 cfs. This corresponds to a decrease in flow of 1 cfs when compared to the No Action Alternative conditions.

5.7.2.2 Pioneer Tract Year 2048 Implementation Effects on the Peace River at Arcadia

Table 72 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 100 percent capture of stormwater in the capture area of the Pioneer Tract at the Peace River at Arcadia station. The maximum influence in this subwatershed was predicted to occur at 2060, right at the horizon of this analysis. Based on projected land use changes within the subwatershed and upstream subwatersheds, flows are predicted to increase through 2060. Annual average flow increases by approximately 9 percent by 2060, dry season flow increases by approximately 8 percent, and wet season flow increases by approximately 11 percent from 2009 levels. Considering the small percentage of land that would be mined compared to the total drainage area of this gage station, the changes in projected land use are predicted to have more of an impact on flow than the Pioneer Tract stormwater capture.

TABLE 72

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 100 Percent Capture at the Peace River at Arcadia Flow Station with the Pioneer Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	713	0%	328	0%	1,657	0%
2020	726	2%	332	1%	1,702	3%
2030	738	4%	336	3%	1,743	5%
2040	754	6%	343	5%	1,785	8%
2050	770	8%	350	7%	1,824	10%
2060	778	9%	353	8%	1,846	11%

Table 73 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 50 percent capture of stormwater in the capture area of the Pioneer Tract at the Peace River at Arcadia gage station. Similar to the 100 percent capture case, based on land use changes within the subwatershed and upstream subwatersheds, flows are predicted to increase during the Pioneer Tract mining period through 2060. Annual average flow increases by approximately 9 percent by 2060, dry season flow increases by approximately 8 percent, and wet season flow increases by approximately 12 percent from 2009 levels.

TABLE 73

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 50 Percent Capture at the Peace River at Arcadia Flow Station with the Pioneer Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	713	0%	328	0%	1,657	0%
2020	726	2%	332	1%	1,702	3%
2030	738	4%	336	3%	1,743	5%
2040	754	6%	343	5%	1,785	8%
2050	771	8%	350	7%	1,826	10%
2060	780	9%	354	8%	1,852	12%

The same evaluation was performed for a low rainfall year. Table 74 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 100 percent capture of stormwater in the capture area of the Pioneer Tract. Similar to the average rainfall scenarios, based on land use changes within the subwatershed and upstream subwatersheds, flows are predicted to increase during the Pioneer Tract mining period through 2060. By 2060 annual average flow increases by approximately 9 percent, dry season flow increases by approximately 8 percent, and wet season flow increases by approximately 12 percent from 2009 levels.

TABLE 74

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 100 Percent Capture at the Peace River at Arcadia Flow Station with the Pioneer Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	330	0%	152	0%	766	0%
2020	337	2%	154	1%	787	3%
2030	342	4%	156	3%	807	5%
2040	350	6%	159	5%	827	8%
2050	357	8%	162	7%	846	10%
2060	361	9%	164	8%	856	12%

Table 75 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 50 percent capture of stormwater in the capture area of the Pioneer Tract. Similar to the average rainfall year scenario, based on projected land use changes within the subwatershed and upstream subwatersheds, flows are predicted to increase during the Pioneer Tract mining period through 2060. Annual average flow increases by approximately 10 percent by 2060, dry season flow increases by approximately 8 percent, and wet season flow increases by approximately 12 percent from 2009 levels.

TABLE 75

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 50 Percent Capture at the Peace River at Arcadia Flow Station with the Pioneer Tract

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	330	0%	152	0%	766	0%
2020	337	2%	154	1%	787	3%
2030	342	4%	156	3%	807	5%
2040	350	6%	159	5%	827	8%
2050	358	8%	163	7%	847	11%
2060	362	10%	164	8%	859	12%

To illustrate the effect on Peace River at Arcadia stream flow under the conditions and scenarios evaluated, the results are presented graphically and compared to the No Action Alternative conditions. Figures 86 and 87 present the seasonal and annual average flows calculated for the Peace River at Arcadia gage station with and without the Pioneer Tract based on 100 percent capture and 50 percent capture of stormwater, respectively, during average rainfall conditions.

FIGURE 86

Peace River at Arcadia Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without the Pioneer Tract

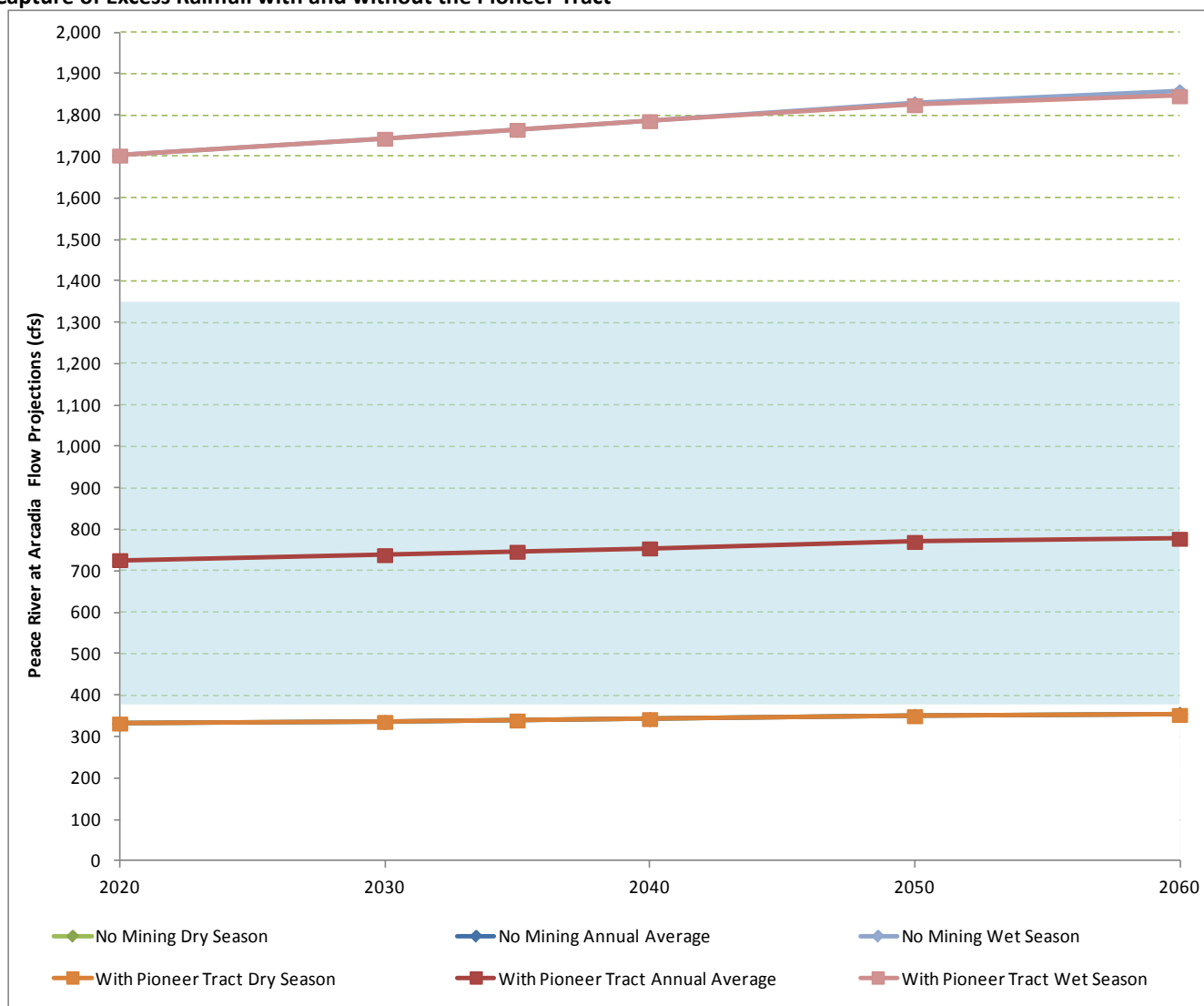
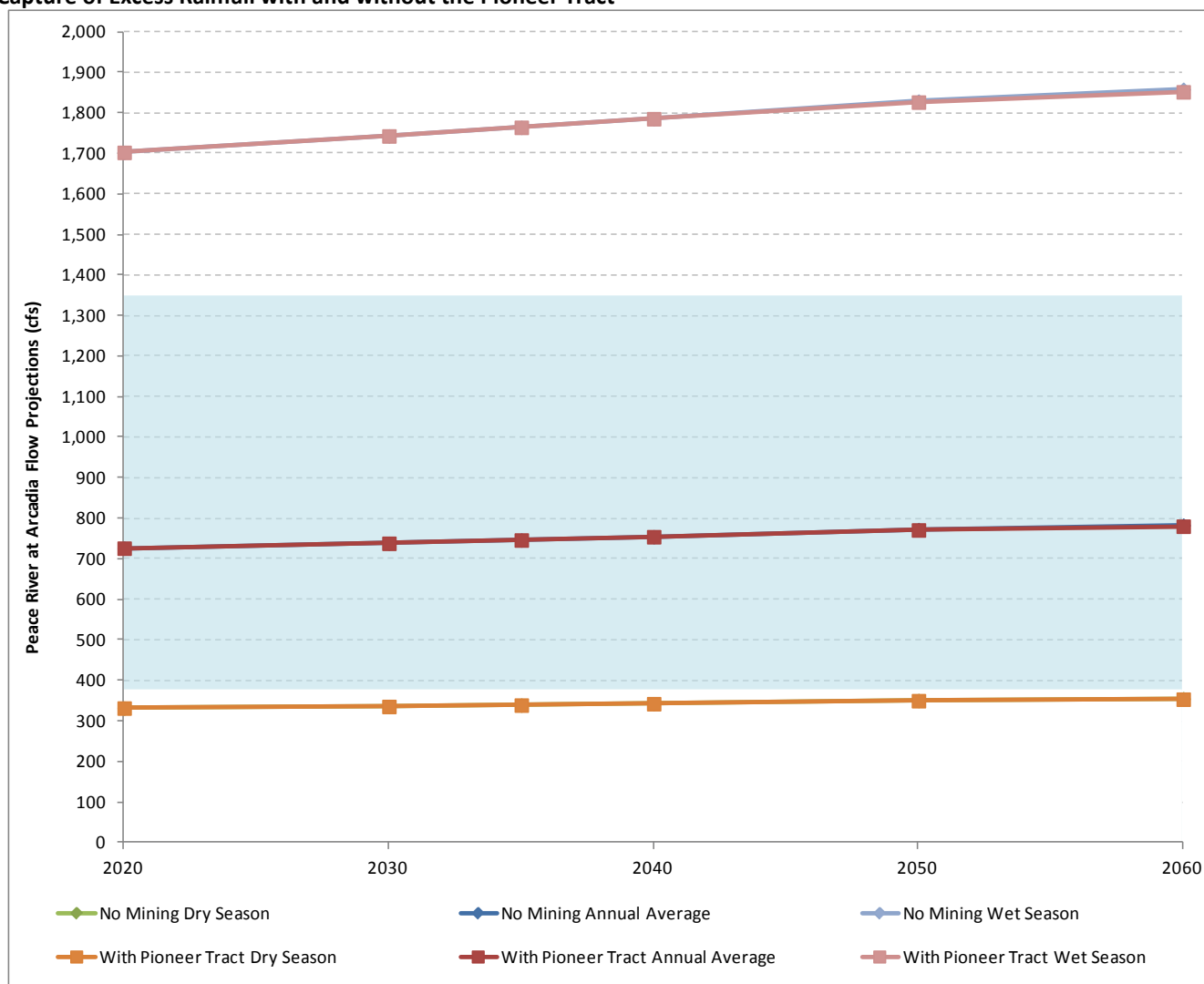


FIGURE 87

Peace River at Arcadia Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without the Pioneer Tract



The largest influences on annual average flow from the Peace River at Arcadia subwatershed during average rainfall conditions were predicted for 2060 based on the capture analysis. Based on 100 percent capture of stormwater, Peace River at Arcadia may have an average annual flow of approximately 783 cfs without the Pioneer Tract and approximately 778 cfs with the Pioneer Tract by 2060. Reductions in flow resulting from mine capture are expected to be less than the anticipated flow increases associated with projected changes in land use. Assuming a 50 percent capture of stormwater, Peace River at Arcadia may have an average annual flow of approximately 780 cfs as well, nearly the same as the 100 percent capture case.

Figures 88 and 89 present the seasonal and annual average flows calculated for the Peace River at Arcadia gage station with and without the Pioneer Tract based on 100 percent capture and 50 percent capture of stormwater, respectively, during low rainfall conditions.

FIGURE 88

Peace River at Arcadia Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without the Pioneer Tract

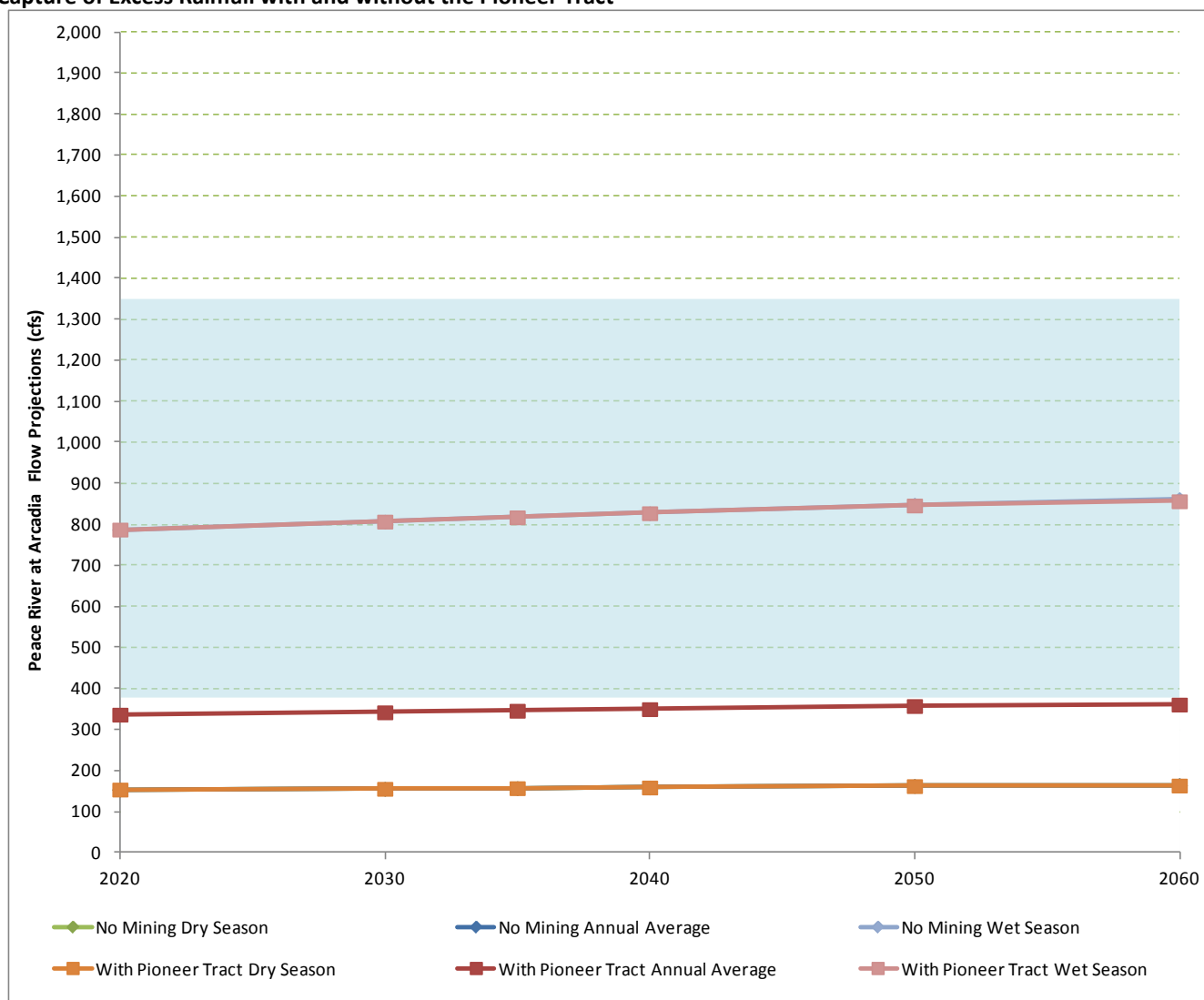
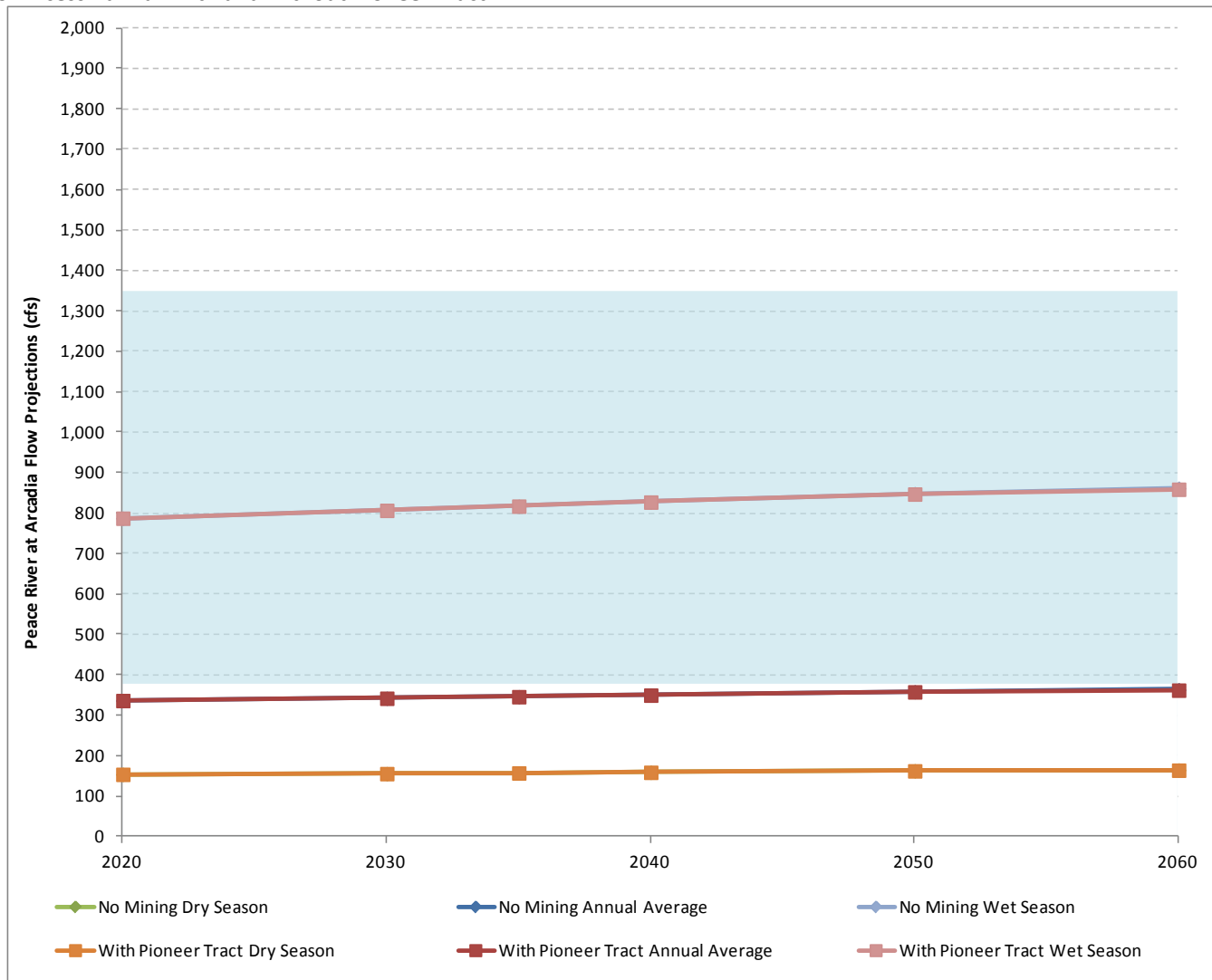


FIGURE 89

Peace River at Arcadia Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without Pioneer Tract



Results of the low rainfall year were similar to average rainfall conditions. Based on 100 percent capture of stormwater, Peace River at Arcadia may have an average annual flow of approximately 363 cfs without the Pioneer Tract and approximately 361 cfs with the Pioneer Tract by 2060. Assuming a 50 percent capture of stormwater, Peace River at Arcadia may have an average annual flow of approximately 362 cfs, nearly identical to the 100 percent capture case.

The Pioneer Tract supposes a small relative contribution to the flows measured at the Peace River at Arcadia gage station. The Pioneer Tract effect on flow quantities at this station would likely not be perceivable, particularly since flows are expected to increase as a result of projected land use changes in the Peace River at Arcadia drainage area.

5.8 Site A-2 and Site W-2 Offsite Alternative Impacts on Runoff Characteristics and Stream Flow

No Applicant has proposed either of these alternatives as a future mine project and no information exists as to whether they might be mine extensions or stand-alone new mines. Development of a mine plan for any of these alternatives to use in evaluating their effect on surface waters would be speculative. Therefore, quantitative analyses similar to those run for the Applicants' Preferred Alternatives were not performed. It may be assumed,

since these parcels have conditions affecting surface water contributions that are similar to conditions of the other alternatives, that mining activities on these parcels would have similar results.

Site A-2 is east of the South Fort Meade Mine (existing) at the edge of the Peace River at Zolfo subwatershed. The GIS mapping analysis shows a very small portion of this alternative overlapping Charlie Creek's subwatershed boundary, but the area there is negligible and may be attributed to mapping accuracy. Site A-2 is approximately 8,189 acres with about 1,949 acres in hydric soils and wetlands (see AEIS, Table 2-4). If relatively large portions of the wetlands are not available for mining (i.e., avoided), then this alternative would be about the same size as the South Pasture Mine Extension. The South Pasture Mine Extension analysis showed small effects on the Peace River at Arcadia subwatershed, because it did not have much area in this subwatershed. Site A-2 is primarily in the Peace River at Zolfo subwatershed, but at its most eastern edge. This subwatershed tends to deliver less water downstream in dry periods because there is more seepage into the surficial aquifer from the streams north of Fort Meade (Metz and Lewelling, 2009). There is no information about potential mining in this alternative, so it is unknown how soon it could be developed. Given that Site A-2 is relatively small compared to other mines in the area, and that mining could be started after existing mines are reclaimed, one would expect similar small impacts from this alternative.

Site W-2 is in the upper Myakka River subwatershed and it is approximately 9,719 acres in size, but there are substantial areas of hydric soils and forested wetlands that may not be available for mining (see AEIS, Table 2-4). Assuming that relatively large portions of the wetlands may not be available for mining (i.e., avoided), Site W-2 is still about twice the size of the Wingate East Mine. Wingate East is expected to have a negligible effect on downstream surface water delivery, partially attributed to the wet dredge method used there. The hydrologic effect on offsite surface water delivery from Site W-2 would be different because dragline methods would more likely be used. However, the downstream impacts should be between the magnitude estimated for the South Pasture Mine Extension and Ona Mines on the Horse Creek subwatershed because Site W-2's area is about midway between these other sites. The maximum impacts for the two Horse Creek mines were in the 7- to 13-cfs range, respectively. When compared to the range of flow of the No Action Alternative results of about 250 to 270 cfs in the upper Myakka River subwatershed (depending on the year), the impact is small. In general, the SWFWMD is seeking ways of reducing surface water flow in the upper Myakka River, so one would expect that any small reduction would be a minor impact in this subwatershed.

5.9 Cumulative Impacts on Runoff Characteristics and Stream Flow

By calibrating the coefficients used to estimate future flows to observed data, the past cumulative impacts on subwatershed surface water yield are implicitly included in the baseline existing conditions. Estimating the future runoff conditions after existing mines are reclaimed also accounts for cumulative impacts considered in the AEIS. Aggregated impacts, that is, the surface water flows when multiple mines may be operating at once, are also provided in the AEIS and this section provides these results when multiple mines operate at the same time in each subwatershed, watershed, and the upper Charlotte Harbor estuary. The cumulative projected effect on flows in the subwatersheds was calculated by summing the impact of the individual capture areas analysis of mine alternatives in the subwatershed for each time interval. This section provides results for the Horse Creek subwatershed, Peace River at Arcadia subwatershed, Peace River subwatersheds combined, Myakka River combined, and then the Peace River and Myakka River combined flows into upper Charlotte Harbor.

5.9.1 Horse Creek Cumulative Impact

The impacts from three of the current actions (Desoto, Ona, and South Pasture Mine Extension) and the two reasonably foreseeable actions (Pioneer Tract and Pine Level/Keys Tract) that would operate with overlapping schedules⁸ in the Horse Creek subwatershed were calculated by summing the impacts from the individual alternatives. The analysis was conducted for wet and dry seasons during an average rainfall year and for wet and

⁸ Not all mines operate concurrently, especially for the Pioneer and Pine Level/Keys Tracts which follow the completion of Ona and Desoto mines, respectively.

dry seasons during a low rainfall year based on all of the stormwater within the capture area (i.e., active mine blocks) being captured (100 percent capture) and based on half of the net stormwater within the capture area being captured (50 percent capture). To illustrate the potential typical effect on stream flow, an average rainfall of 50 in/yr was applied as the average annual rainfall for the Peace River watershed.

Table 76 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 100 percent capture of stormwater in the capture areas of the three current and two foreseeable actions within this subwatershed. The maximum influence was predicted to occur around 2035 according to the capture analysis and flow results. Annual average flow decreases by approximately 17 percent by 2035, dry season flow decreases by approximately 18 percent, and wet season flow decreases by approximately 15 percent from 2009 levels. However, most mines are reclaimed by 2060, except for Pioneer and Pine Level/Keys Tracts implemented as mine extensions, and flows return nearly to the levels predicted for 2009.

TABLE 76

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 100 Percent Capture at the Horse Creek Flow Station with Three Current Actions and Two Foreseeable Actions within the Horse Creek Subwatershed

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	171	0%	78	0%	404	0%
2020	171	0%	77	0%	410	1%
2030	147	-14%	66	-15%	353	-13%
2035	142	-17%	64	-18%	343	-15%
2040	151	-12%	68	-13%	363	-10%
2050	160	-6%	72	-7%	385	-5%
2060	169	-1%	76	-2%	406	1%

Table 77 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 50 percent capture of stormwater in the capture areas of the three current and two foreseeable actions within this subwatershed. The maximum influence was predicted to occur around 2035 according to the capture analysis and flow results. Annual average flow decreases by approximately 7 percent by 2035, dry season flow decreases by approximately 8 percent, and wet season flow decreases by approximately 6 percent from 2009 levels. However, by 2060 annual average and dry season flows return to the approximate levels predicted for 2009, with a slight increase for the wet season.

TABLE 77

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 50 Percent Capture at the Horse Creek Flow Station with Three Current Actions and Two Foreseeable Actions within the Horse Creek Subwatershed

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	171	0%	78	0%	404	0%
2020	172	1%	78	0%	411	2%
2030	160	-6%	72	-7%	385	-5%
2035	159	-7%	71	-8%	382	-6%
2040	162	-5%	73	-6%	389	-4%
2050	168	-2%	75	-3%	403	0%
2060	173	1%	78	0%	415	3%

The same evaluation was performed for a low rainfall year. Low rainfall conditions were estimated as the 20th percentile of the annual rainfall totals for the period of record (i.e., 80 percent of the years had higher rainfall). For the Horse Creek cumulative analysis, this low rainfall calculation used 43 inches of rainfall per year.

Table 78 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 100 percent capture of stormwater in the capture area of the three current and two foreseeable actions within the Horse Creek subwatershed. The maximum influence was predicted to occur around 2035 according to the capture analysis and flow results. Similar to the average rainfall scenarios, based on land use changes within the subwatershed and upstream subwatersheds, annual average flow decreases by approximately 17 percent by 2035, dry season flow decreases by approximately 18 percent, and wet season flow decreases by approximately 15 percent from 2009 levels. However, by 2060 annual average flows return to the approximate levels predicted for 2009, with a slight decrease for the dry season and an increase for the wet season.

TABLE 78

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 100 Percent Capture at the Horse Creek Flow Station with Three Current Actions and Two Foreseeable Actions within the Horse Creek Subwatershed

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	84	0%	38	0%	199	0%
2020	84	0%	38	0%	200	1%
2030	72	-14%	32	-15%	173	-13%
2035	70	-17%	31	-18%	168	-15%
2040	74	-12%	33	-13%	178	-10%
2050	79	-6%	35	-7%	189	-5%
2060	83	-1%	37	-2%	200	1%

Table 79 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 50 percent capture of stormwater in the capture area of three current and two foreseeable actions within the Horse Creek subwatershed. The maximum influence was predicted to occur around 2035 according to

the capture analysis and flow results. Similar to the average rainfall scenarios, based on land use changes within the subwatershed and upstream subwatersheds, annual average flow decreases by approximately 7 percent by 2035, dry season flow decreases by approximately 8 percent, and wet season flow decreases by approximately 6 percent from 2009 levels. However, by 2060 annual average and dry season flows return to the approximate levels predicted for 2009, with a slight increase for the wet season.

TABLE 79

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 50 Percent Capture at the Horse Creek Flow Station with Three Current Actions and Two Foreseeable Actions within the Horse Creek Subwatershed

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	84	0%	38	0%	199	0%
2020	85	1%	38	0%	202	2%
2030	79	-6%	35	-7%	189	-5%
2035	78	-7%	35	-8%	188	-6%
2040	80	-5%	36	-6%	191	-4%
2050	82	-2%	37	-3%	198	0%
2060	85	1%	38	0%	204	3%

To illustrate the effect on Horse Creek stream flow under the conditions and scenarios evaluated, the results are presented graphically and compared to the No Action Alternative conditions. Figures 90 and 91 present the dry season, wet season, and annual average flows calculated for the Horse Creek gage station with and without the three current and two foreseeable actions in operation for the 100 percent capture and the 50 percent capture cases, respectively.

FIGURE 90

Horse Creek Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without the Three Current Actions and Two Foreseeable Actions

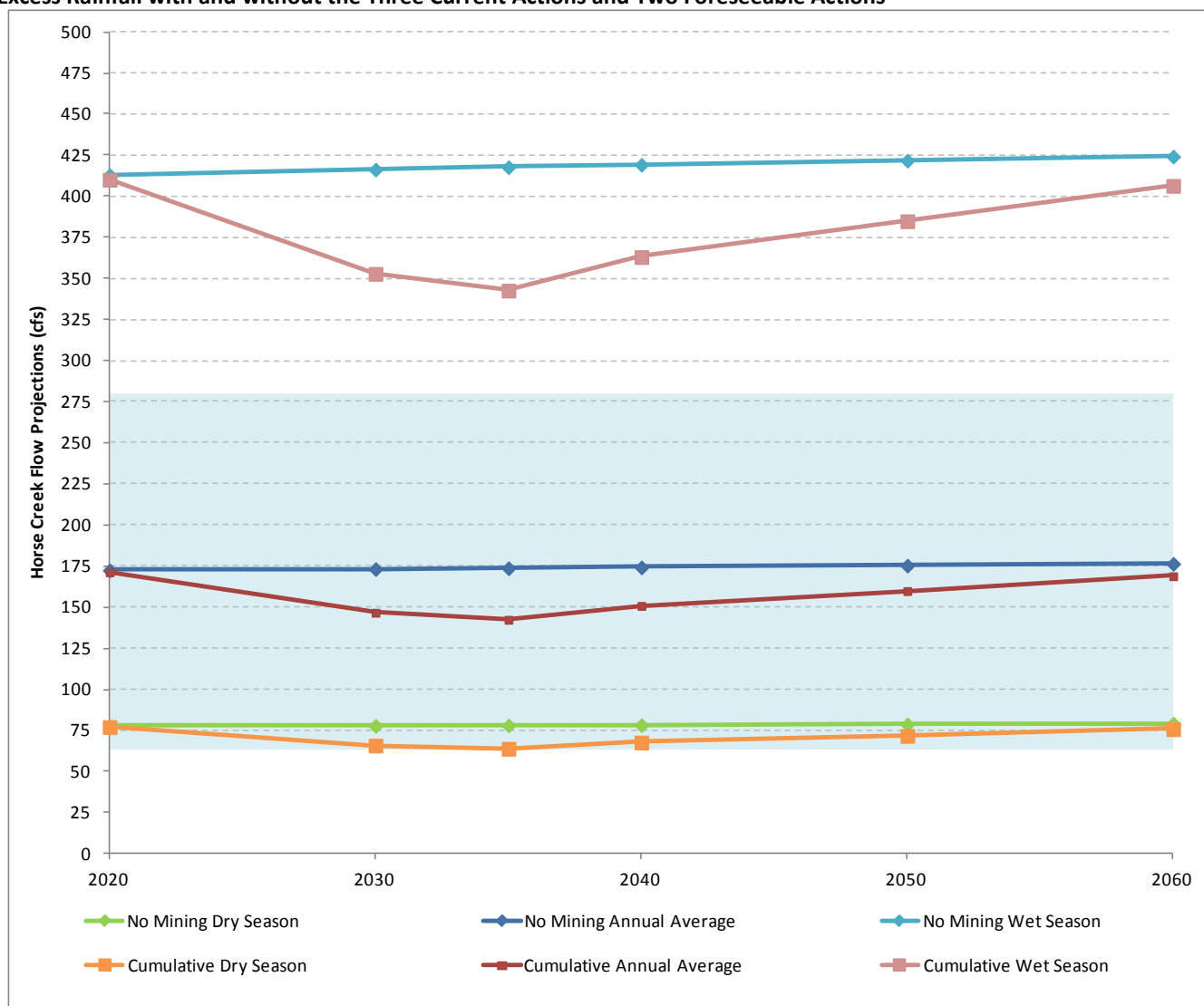
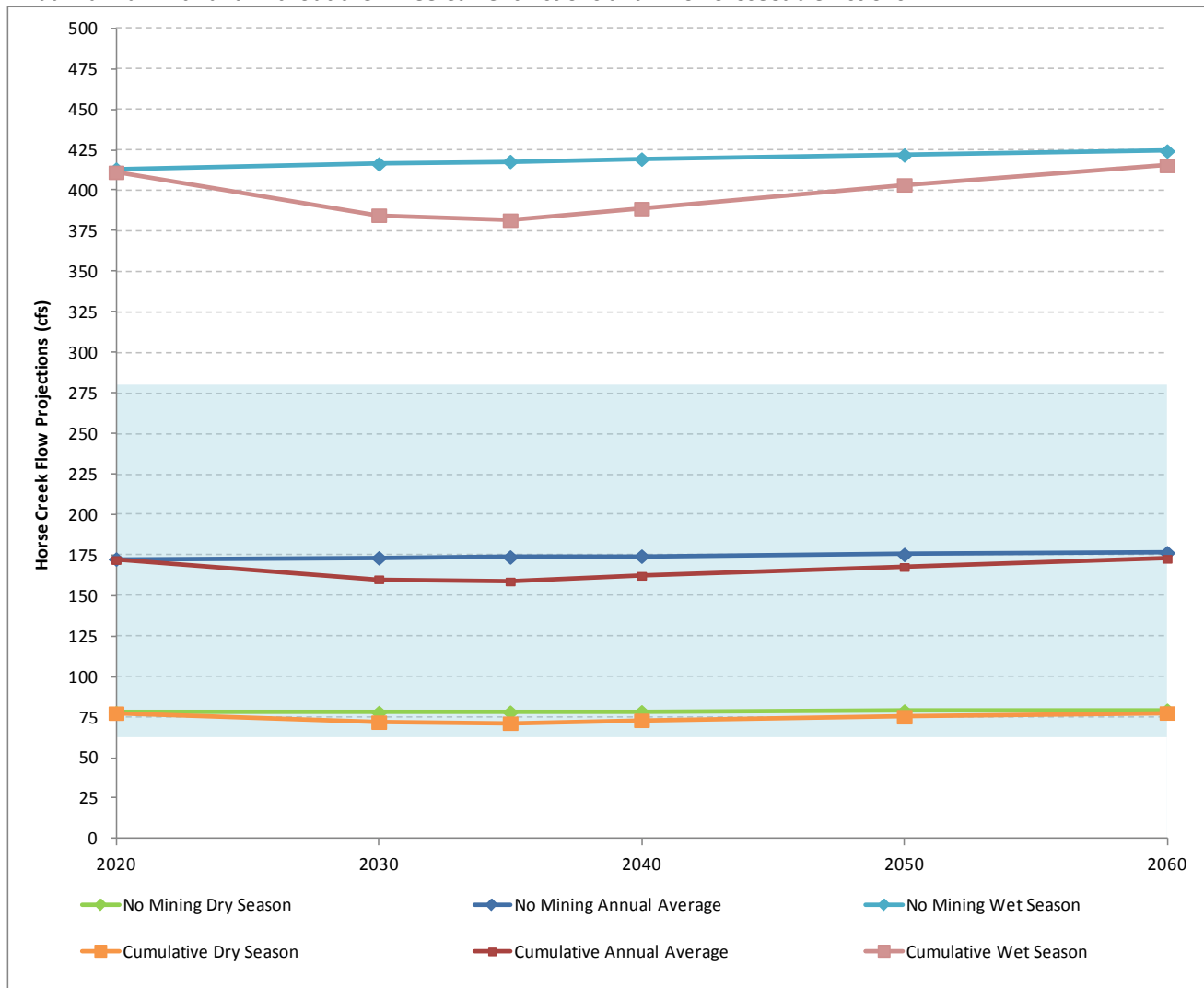


FIGURE 91

Horse Creek Seasonal and Annual Average Projected Flows for 50 Percent Capture of Excess Rainfall Case during Average Annual Rainfall with and without the Three Current Actions and Two Foreseeable Actions



The largest influences on annual average flow from the Horse Creek subwatershed during average rainfall conditions were predicted to occur around 2035. Based on 100 percent capture of stormwater, Horse Creek may have an average annual flow of approximately 174 cfs without mining and approximately 142 cfs with mining by 2035. Assuming a 50 percent capture of stormwater, Horse Creek may have an average annual flow of approximately 159 cfs.

Figures 92 and 93 present the seasonal and annual average flows calculated for the Horse Creek gage station with and without the three current and two foreseeable actions in operation for the 100 percent capture and the 50 percent capture cases, respectively, during low rainfall conditions.

FIGURE 92

Horse Creek Seasonal and Annual Average Projected Flows for 100 Percent Capture of Excess Rainfall Case during Low Annual Rainfall with and without the Three Current Actions and Two Foreseeable Actions

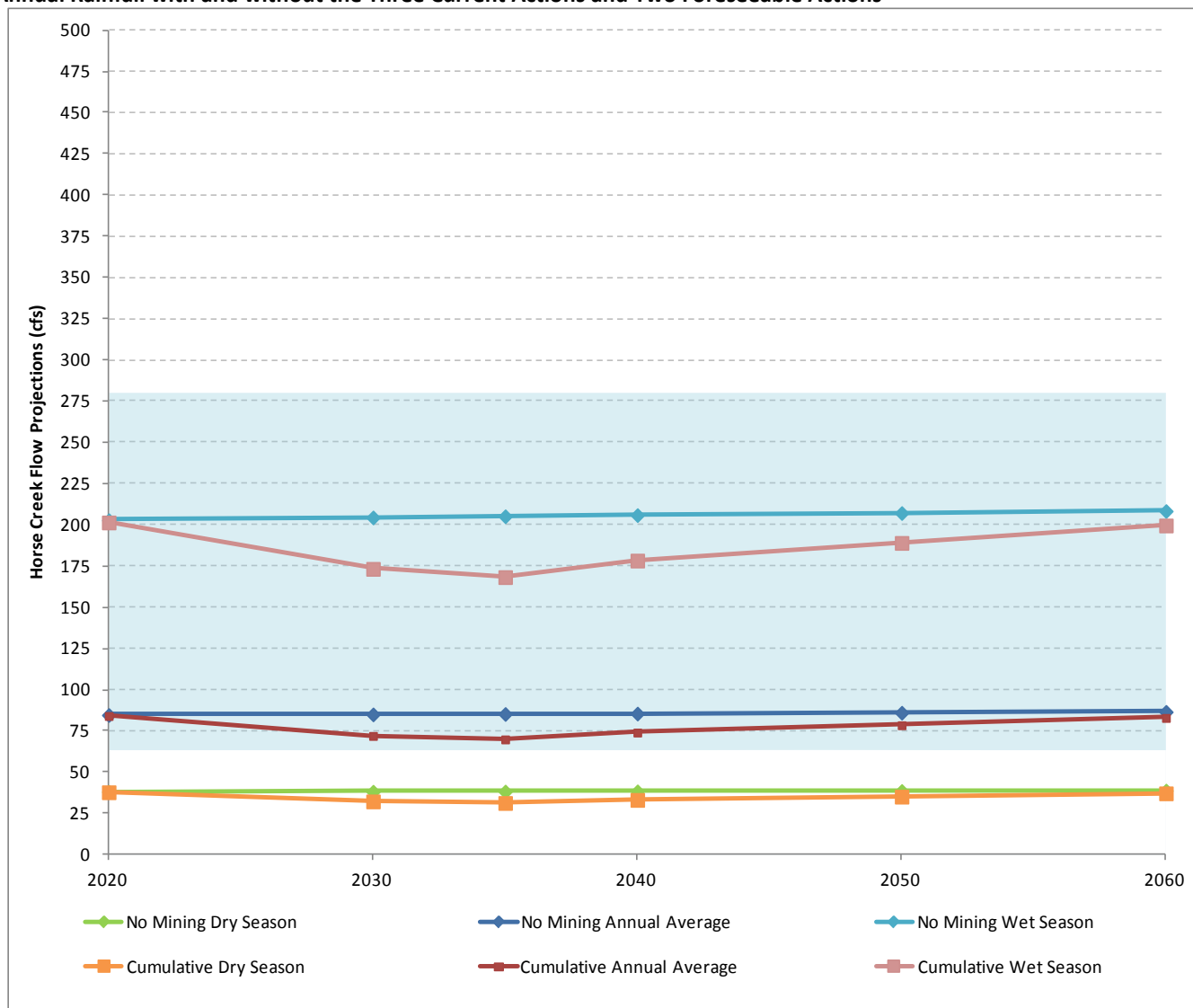
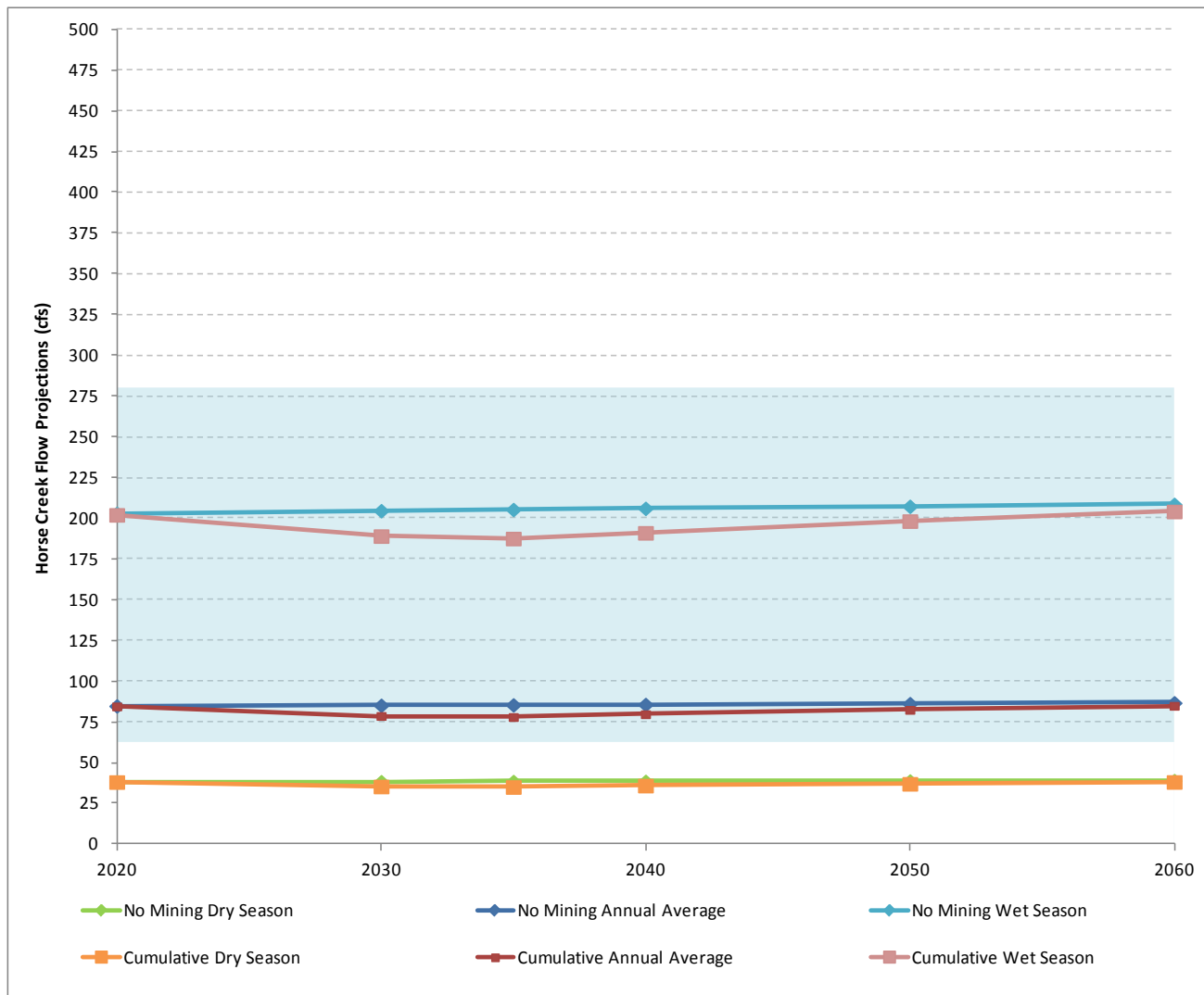


FIGURE 93

Horse Creek Seasonal and Annual Average Projected Flows for 50 Percent Capture of Excess Rainfall Case during Low Annual Rainfall with and without the Three Current Actions and Two Foreseeable Actions



The largest influence on annual average flow from the Horse Creek subwatershed during low rainfall conditions was predicted to occur around 2035. Based on 100 percent capture of stormwater, Horse Creek may have an average annual flow of approximately 85 cfs without mining and approximately 70 cfs with mining by 2035. Assuming a 50 percent capture of stormwater, Horse Creek may have an average annual flow of approximately 78 cfs.

There are no SWFWMD minimum flow or levels (MFLs) established for Horse Creek to which this reduction can be compared. Through the monitoring program and other provisions in FDEP permits, if it is determined that there is an impact to the creek, the Applicants would need to address them in a manner and on a schedule acceptable to the regulators (both state and federal).

5.9.2 Peace River at Arcadia Cumulative Impact

The impact from the three current actions (Desoto, Ona, and South Pasture Mine Extension) and the one foreseeable future action (Pioneer Tract) operating concurrently was calculated by evaluating the cumulative effects on the runoff coefficients in the Peace River at Arcadia subwatershed using the same process used for Horse Creek. The analysis was conducted for wet and dry seasons during an average rainfall year and for wet and dry seasons during a low rainfall year based on all of the runoff within the capture area being captured

(100 percent capture) and based on half of the runoff within the capture area being captured (50 percent capture). To illustrate the potential impacts on stream flow, an average rainfall of 50 in/yr was applied as the average annual rainfall for the Peace River watershed.

Table 80 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 100 percent capture of stormwater in the capture areas of the three current actions and one foreseeable action within this watershed. The maximum influence was predicted to occur beyond 2060 according to the capture analysis. Therefore, the 2060 results are reported as the maximum impact period. Even when considering the three current actions and one foreseeable action within the Peace River at Arcadia subwatershed, projected land use changes in this subwatershed and upstream subwatersheds result in increases in flow. Most mines are reclaimed by 2060, except for Pioneer and Pine Level/Keys Tracts implemented as mine extensions, and the projected flows on average increase by 9 percent, with an increase of 7 percent in the dry season and an increase of 11 percent in the wet season when compared to 2009 flows.

TABLE 80

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 100 Percent Capture at the Peace River at Arcadia Flow Station with Three Current Actions and One Foreseeable Action

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	713	0%	328	0%	1,657	0%
2020	726	2%	332	1%	1,701	3%
2030	735	3%	334	2%	1,735	5%
2040	750	5%	340	4%	1,779	7%
2050	769	8%	348	6%	1,820	10%
2060	777	9%	352	7%	1,846	11%

Table 81 presents the flow and percent change from 2009 average annual and seasonal flows during an average rainfall year with 50 percent capture of stormwater in the capture areas of the three current actions and one foreseeable action within this watershed. By 2060 the projected annual average flow increases by 9 percent when compared to 2009 levels, with an increase of 8 percent in the dry season and an increase of 12 percent in the wet season. These results were similar to those predicted with the 100 percent capture case. The total footprints of the three current and one foreseeable action encompass a small percentage of the total drainage area for this gage station, so the changes in projected land use have a far larger impact on flow than mining.

The same evaluation was performed for a low rainfall year (43 inches per year). Table 82 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 100 percent capture of stormwater in the capture area of the three current and one foreseeable action within the Peace River at Arcadia subwatershed. By 2060 the projected annual average flow increases by 9 percent, with an increase of 8 percent in the dry season and an increase of 12 percent in the wet season when compared to 2009 flows.

Table 83 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 50 percent capture of stormwater in the capture area of the three current and one foreseeable action within the Peace River at Arcadia subwatershed. By 2060 the projected annual average flow increases by 10 percent, with an increase of 8 percent in the dry season and an increase of 12 percent in the wet season. Similar to the average rainfall analysis, the total footprints of the three current and one foreseeable action encompass a small percentage of the total drainage area for this gage station, so the changes in projected land use have a far larger effect on flow than mining.

TABLE 81

Projected Flows and Percent Change from 2009 Flows during Average Rainfall Year and 50 Percent Capture at the Peace River at Arcadia Flow Station with Three Current Actions and One Foreseeable Action

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	713	0%	328	0%	1,657	0%
2020	726	2%	332	1%	1,702	3%
2030	737	3%	335	2%	1,739	5%
2040	753	6%	342	4%	1,782	8%
2050	770	8%	350	7%	1,825	10%
2060	780	9%	354	8%	1,852	12%

TABLE 82

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 100 Percent Capture at the Peace River at Arcadia Flow Station with Three Current Actions and One Foreseeable Action

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	330	0%	152	0%	766	0%
2020	336	2%	154	1%	787	3%
2030	341	3%	155	2%	804	5%
2040	348	5%	158	4%	825	8%
2050	356	8%	162	6%	845	10%
2060	361	9%	163	8%	856	12%

TABLE 83

Projected Flows and Percent Change from 2009 Flows during Low Rainfall Year and 50 Percent Capture at the Peace River at Arcadia Flow Station with the Three Current Actions and One Foreseeable Action

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	330	0%	152	0%	766	0%
2020	336	2%	154	1%	787	3%
2030	341	3%	155	2%	805	5%
2040	349	6%	159	5%	826	8%
2050	358	8%	162	7%	846	11%
2060	362	10%	164	8%	859	12%

To illustrate the effect on Peace River at Arcadia stream flow under the conditions and scenarios evaluated, the results are presented graphically and compared to the No Action Alternative conditions. Figures 94 and 95 present

the dry season, wet season, and annual average flows calculated for the Peace River at Arcadia gage station with and without the three current and one foreseeable action in operation for the 100 percent capture and the 50 percent capture cases, respectively.

FIGURE 94

Peace River at Arcadia Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without the Three Current Actions and One Foreseeable Action

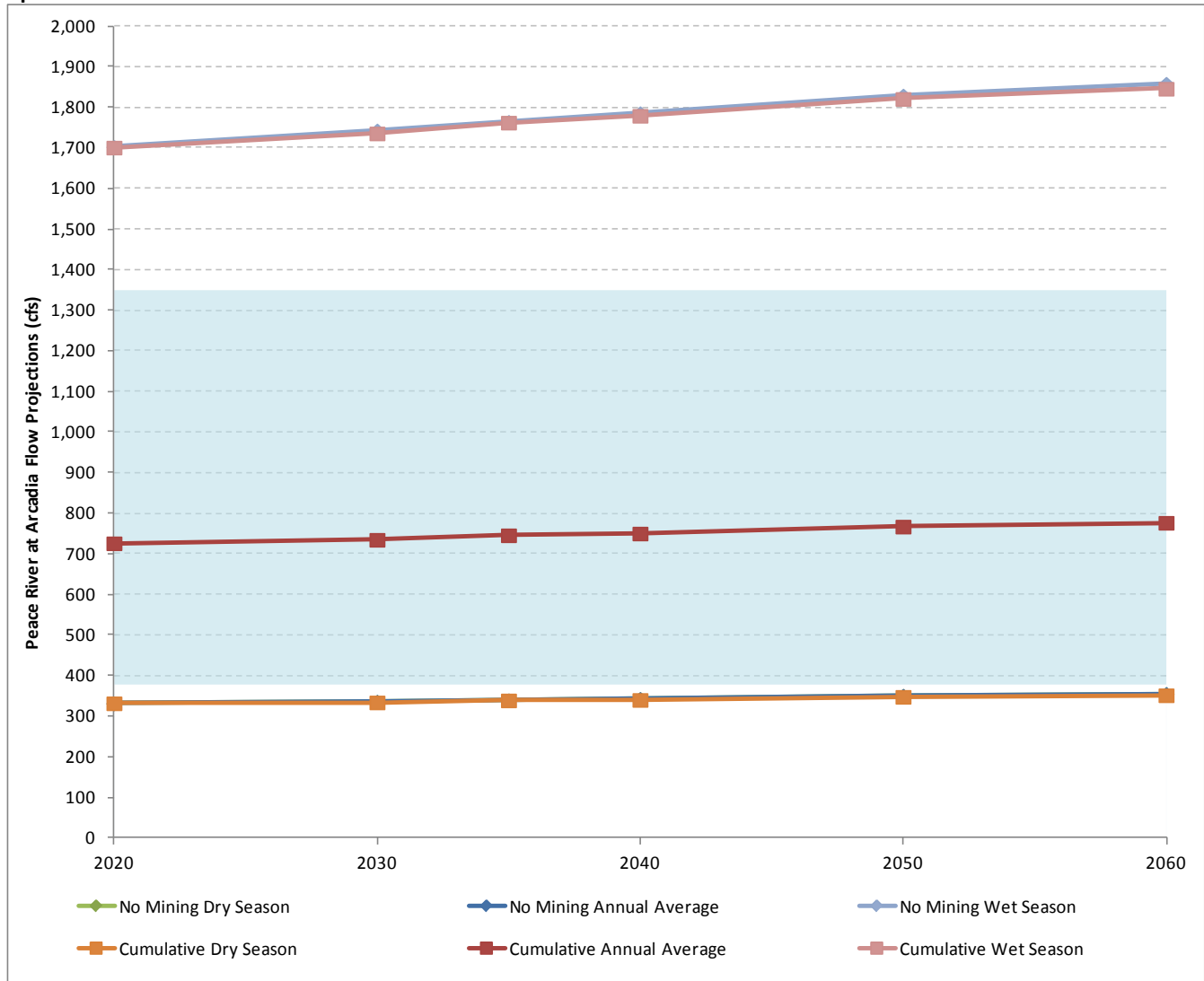
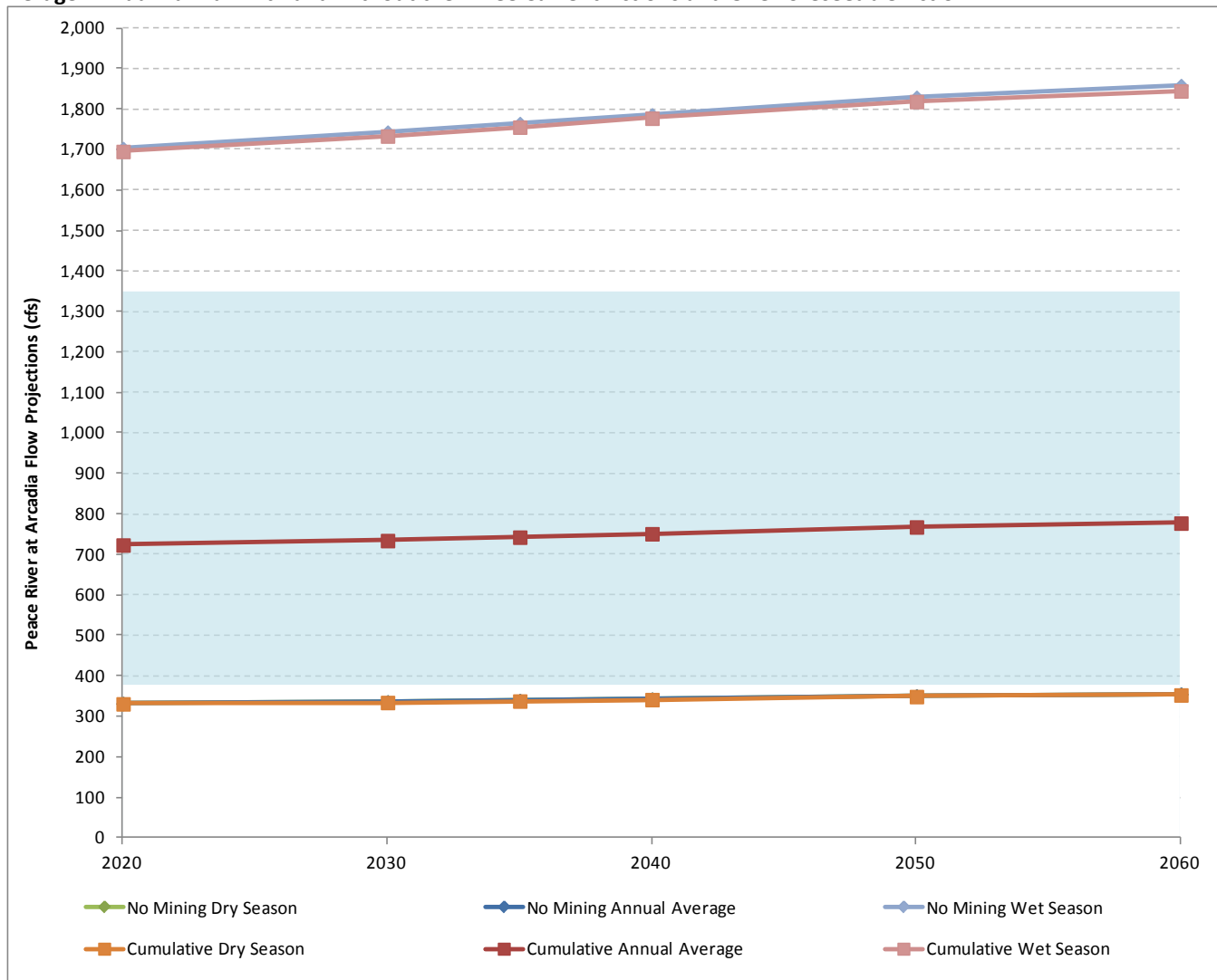


FIGURE 95

Peace River at Arcadia Seasonal and Annual Average Projected Flows for 50 Percent Capture of Excess Rainfall Case during Average Annual Rainfall with and without the Three Current Actions and One Foreseeable Action



The largest influence on annual average flow from the Peace River at Arcadia subwatershed during average rainfall conditions was predicted to occur after 2060 based on the capture analyses. Based on 100 percent capture of stormwater, Peace River at Arcadia may have an average annual flow of approximately 783 cfs without mining and approximately 776 cfs with mining by 2060. Assuming a 50 percent capture of stormwater, Peace River at Arcadia may have an average annual flow of approximately 780 cfs. This suggests that the mine capture within this subwatershed has a marginal effect on stream flow when considering the changes in land use within this subwatershed and upstream subwatersheds.

Figures 96 and 97 present the seasonal and annual average flows calculated for the Peace River at Arcadia gage station with and without the mines Pioneer Tract based on 100 percent capture and 50 percent capture of stormwater, respectively, during low rainfall conditions.

FIGURE 96

Peace River at Arcadia Seasonal and Annual Average Projected Flows for 100 Percent Capture of Excess Rainfall Case during Low Annual Rainfall with and without the Three Current Actions and One Foreseeable Action

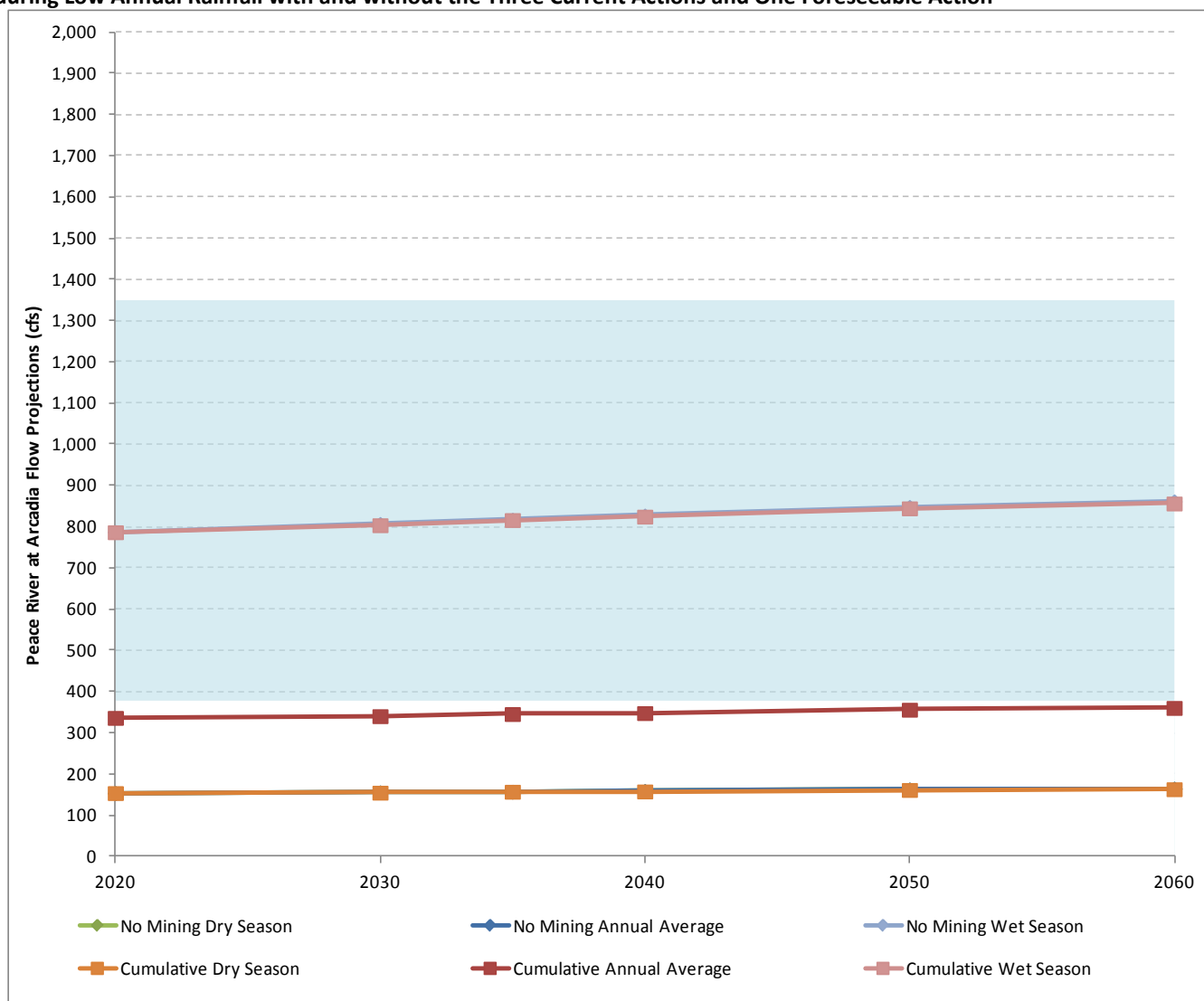
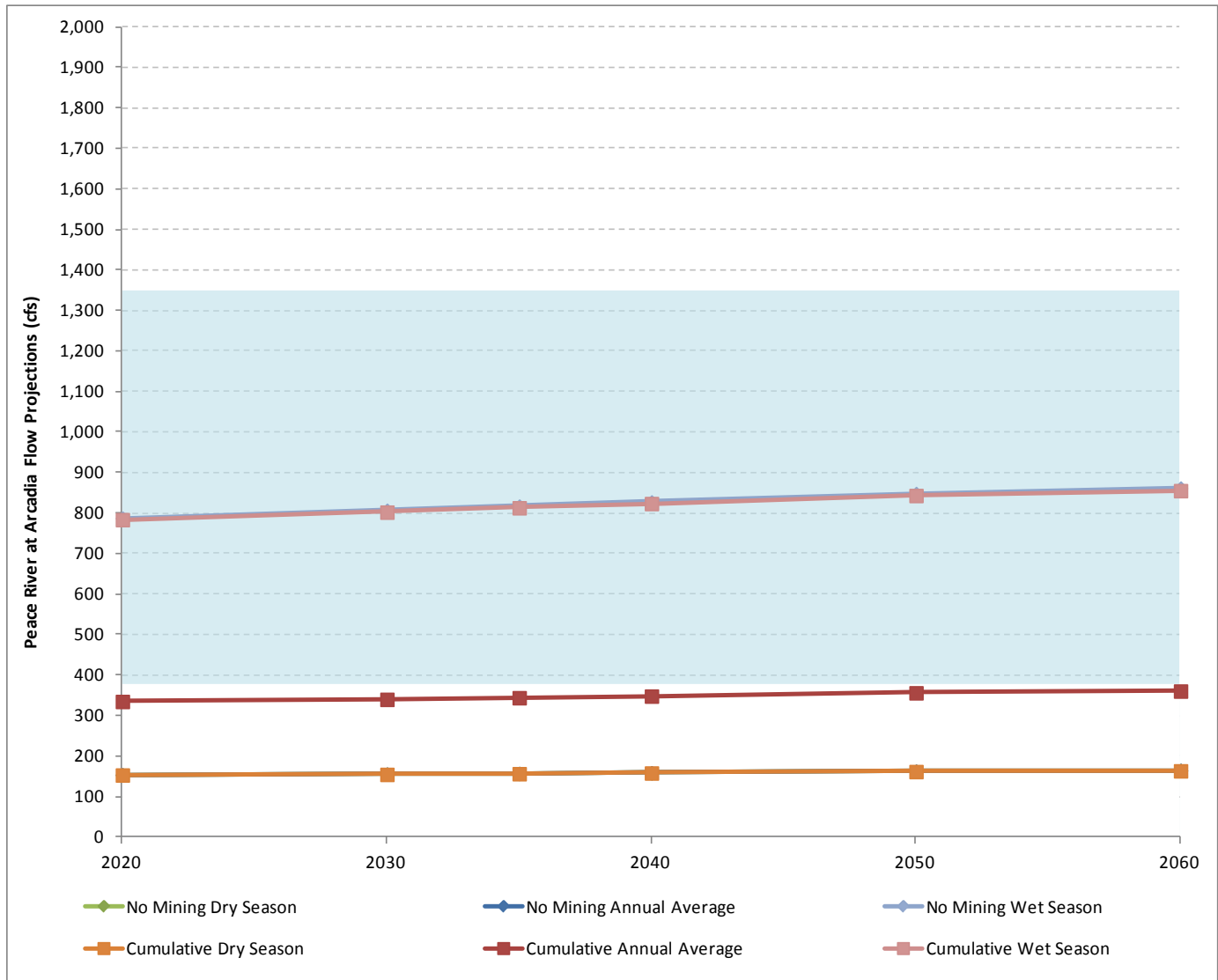


FIGURE 97

Peace River at Arcadia Seasonal and Annual Average Projected Flows for 50 Percent Capture of Excess Rainfall Case during Low Annual Rainfall with and without the Three Current Actions and One Foreseeable Action



The largest influence on annual average flow from the Peace River at Arcadia subwatershed during low rainfall conditions was predicted to after 2060 based on the mine capture analyses. Based on 100 percent capture of stormwater, Peace River at Arcadia may have an average annual flow of approximately 363 cfs without mining and approximately 361 cfs with mining between 2030 and 2040. Assuming a 50 percent capture of stormwater, Peace River at Arcadia may have an average annual flow of approximately 362 cfs. The MFL for Peace River at Arcadia is 67 cfs, which is much lower than the predicted flow at the lowest 20th percentile annual rainfall. The three current and one foreseeable action in this subwatershed have very minor impact at the gage location and are would not be expected to reduce flow by a level that could be easily detected.

5.9.3 Charlotte Harbor Estuary Cumulative Impacts

The deliveries of flow to the upper Charlotte Harbor Estuary from both the Peace River and Myakka River watersheds were projected by applying the runoff coefficient approach to the river watersheds at the downstream USGS stations. There are some additional contributing uplands downstream of these gages that also contribute flow to the estuary. The flow listed in this subsection is therefore not an estimate of the total flow, but

only from those freshwater sources that are discussed in the analysis and Shell Creek in the Peace River watershed and the Big Slough Basin and upper Myakka River subwatershed (USGS gage near Sarasota) in the Myakka River watershed. The lower Charlotte Harbor Estuary area (near Fort Myers) is more heavily influenced by the Caloosahatchee River and is not included here as it is not within the scope of the AEIS. Consequently, the flows presented here are estimates of “most” of the flow from the respective watershed. Percent changes reported are only for the areas contributing to the estuary within the computations.

The impacts to flow from the four current actions and the two reasonably foreseeable actions were estimated by summing the capture areas in each subwatershed. Flow impacts were estimated by using the same capture curves used for the individual subwatershed assessments. This assessment was applied for cases of 100 percent capture of stormwater within the mine capture areas and for 50 percent capture of stormwater within the mine capture areas. Estimates were performed seasonally and for annual average flows for average rainfall conditions and for low rainfall conditions.

5.9.3.1 Peace River Contributions to Upper Charlotte Harbor Estuary Cumulative Impact

Table 84 presents the Peace River contributions to the upper Charlotte Harbor Estuary and percent change from 2009 seasonal and annual average flows for the 100 percent capture of stormwater from the mining capture areas under average rainfall conditions (50 inches per year). The maximum influence was predicted to occur between 2030 and 2040 according to the capture analysis. Annual average flow increases by approximately 2 to 4 percent during the period of 2030 and 2040, dry season flow increases by approximately 1 to 4 percent, and wet season flow increases by approximately 3 to 6 percent from 2009 levels. Even when considering three current actions and two foreseeable actions, projected land use changes in the two watersheds result in increases in future flow. By 2060 most mines are reclaimed, except for Pioneer Tract when implemented as a mine extension, and the projected flows on average increase by 10 percent, with an increase of 9 percent in the dry season and an increase of 12 percent in the wet season when compared to 2009 flows.

TABLE 84

Projected Contributions to the Upper Charlotte Harbor Estuary and Percent Change from 2009 Flows during Average Rainfall Year and 100 Percent Capture with All Current and Foreseeable Actions within the Peace River Watershed

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	1,119	0%	510	0%	2,631	0%
2020	1,144	2%	520	2%	2,705	3%
2030	1,137	2%	515	1%	2,700	3%
2040	1,167	4%	528	4%	2,777	6%
2050	1,203	8%	545	7%	2,860	9%
2060	1,232	10%	557	9%	2,925	11%

Table 85 presents the Peace River contributions to the upper Charlotte Harbor Estuary and percent change from 2009 seasonal and annual average flows for the 50 percent capture of stormwater from the mining capture areas under average rainfall conditions. The maximum influence was predicted to occur between 2030 and 2040 according to the capture analysis. Annual average flow increases by approximately 3 to 6 percent during the period of 2030 and 2040, dry season flow increases by approximately 2 to 5 percent, and wet season flow increases by approximately 4 to 7 percent from 2009 levels. Even when considering the three current actions and two foreseeable actions within the Peace River watershed, projected land use changes in this watershed result in increases in flow. By 2060 the projected flows on average increase by 11 percent, with an increase of 10 percent in the dry season and an increase of 12 percent in the wet season when compared to 2009 flows, with results similar to the 100 percent capture case.

TABLE 85

Projected Contributions to the Upper Charlotte Harbor Estuary and Percent Change from 2009 Flows during Average Rainfall Year and 50 Percent Capture with All Current and Foreseeable Actions within the Peace River Watershed

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	1,119	0%	510	0%	2,631	0%
2020	1,144	2%	520	2%	2,707	3%
2030	1,153	3%	523	2%	2,738	4%
2040	1,182	6%	535	5%	2,806	7%
2050	1,214	9%	550	8%	2,883	10%
2060	1,238	11%	561	10%	2,940	12%

The same evaluation was performed for a low rainfall year (43 inches per year). Table 86 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 100 percent capture of stormwater in the capture area of the three current actions and two foreseeable actions within the Peace River watershed. The maximum influence was predicted to occur between 2030 and 2040 according to the capture analysis. Similar to the average rainfall scenarios, based on land use changes within the subwatershed and upstream subwatersheds, annual average flow increases by approximately between 2 and 5 percent during the period of 2030 and 2040, dry season flow increases by approximately between 2 and 4 percent, and wet season flow increases by approximately between 3 and 6 percent from 2009 levels. By 2060 the projected annual average flow increases by 11 percent, with an increase of 10 percent in the dry season and an increase of 12 percent in the wet season when compared to 2009 flows. Similar to the average rainfall analysis, the total footprints of the three current actions and two foreseeable actions encompass a small percentage of the total drainage area for Charlotte Harbor, so the changes in projected land use have a far larger effect on flow than mining.

TABLE 86

Projected Contributions to the Upper Charlotte Harbor Estuary and Percent Change from 2009 Flows during Low Rainfall Year and 100 Percent Capture with All Current and Foreseeable Actions within the Peace River Watershed

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	568	0%	259	0%	1,338	0%
2020	582	2%	264	2%	1,377	3%
2030	580	2%	263	2%	1,378	3%
2040	596	5%	270	4%	1,418	6%
2050	615	8%	279	8%	1,462	9%
2060	630	11%	285	10%	1,496	12%

Table 87 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 50 percent capture of stormwater in the capture area of the three current actions and two foreseeable actions within the Peace River watershed. The maximum influence was predicted to occur between 2030 and 2040 according to the capture analysis and flow results. Similar to the average rainfall scenarios, based on land use changes within the subwatershed and upstream subwatersheds, annual average flow increases by

approximately between 4 to 6 percent during the period of 2030 and 2040, dry season flow increases by approximately between 3 to 6 percent, and wet season flow increases by approximately between 4 to 7 percent from 2009 levels. By 2060 the projected annual average flow increases by 12 percent, with an increase of 11 percent in the dry season and an increase of 12 percent in the wet season. Similar to the average rainfall analysis, the changes in land use have a far larger effect on flow than mining.

TABLE 87

Projected Contributions to the Upper Charlotte Harbor Estuary and Percent Change from 2009 Flows during Low Rainfall Year and 50 Percent Capture with All Current and Foreseeable Actions within the Peace River Watershed

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	568	0%	259	0%	1,338	0%
2020	582	3%	264	2%	1,378	3%
2030	588	4%	266	3%	1,396	4%
2040	603	6%	273	6%	1,432	7%
2050	620	9%	281	9%	1,473	10%
2060	633	12%	287	11%	1,504	12%

To illustrate the effect on the upper Charlotte Harbor Estuary contributions from the Peace River under the conditions and scenarios evaluated, the results are presented graphically and compared to the No Action Alternative conditions. Figures 98 and 99 present the dry season, wet season and annual average flows calculated for the Peace River with and without the three current actions and two foreseeable actions in operation for the 100 percent capture and the 50 percent capture cases, respectively, under average rainfall conditions.

The largest influence on annual average flow from the Peace River watershed during average rainfall conditions were predicted between 2030 and 2040 based on the capture analyses. Based on 100 percent capture of stormwater, the estimated Peace River contributions to the upper Charlotte Harbor may have an average annual flow of approximately 1,168 to 1,195 cfs without mining, and approximately 1,137 to 1,167 cfs with mining between 2030 and 2040. Assuming a 50 percent capture of stormwater, the Peace River watershed may have an average annual flow of approximately 1,153 to 1,182 cfs. This represents a decrease in flow of about 13 cfs when compared to the No Action Alternative conditions.

Figures 100 and 101 present the seasonal and annual average flows calculated for the Peace River contributions to the upper Charlotte Harbor Estuary with and without the three current actions and two foreseeable actions based on 100 percent capture and 50 percent capture of stormwater respectively during low rainfall conditions.

FIGURE 98

Peace River Contributions to Upper Charlotte Harbor Estuary Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without All Current and Foreseeable Actions

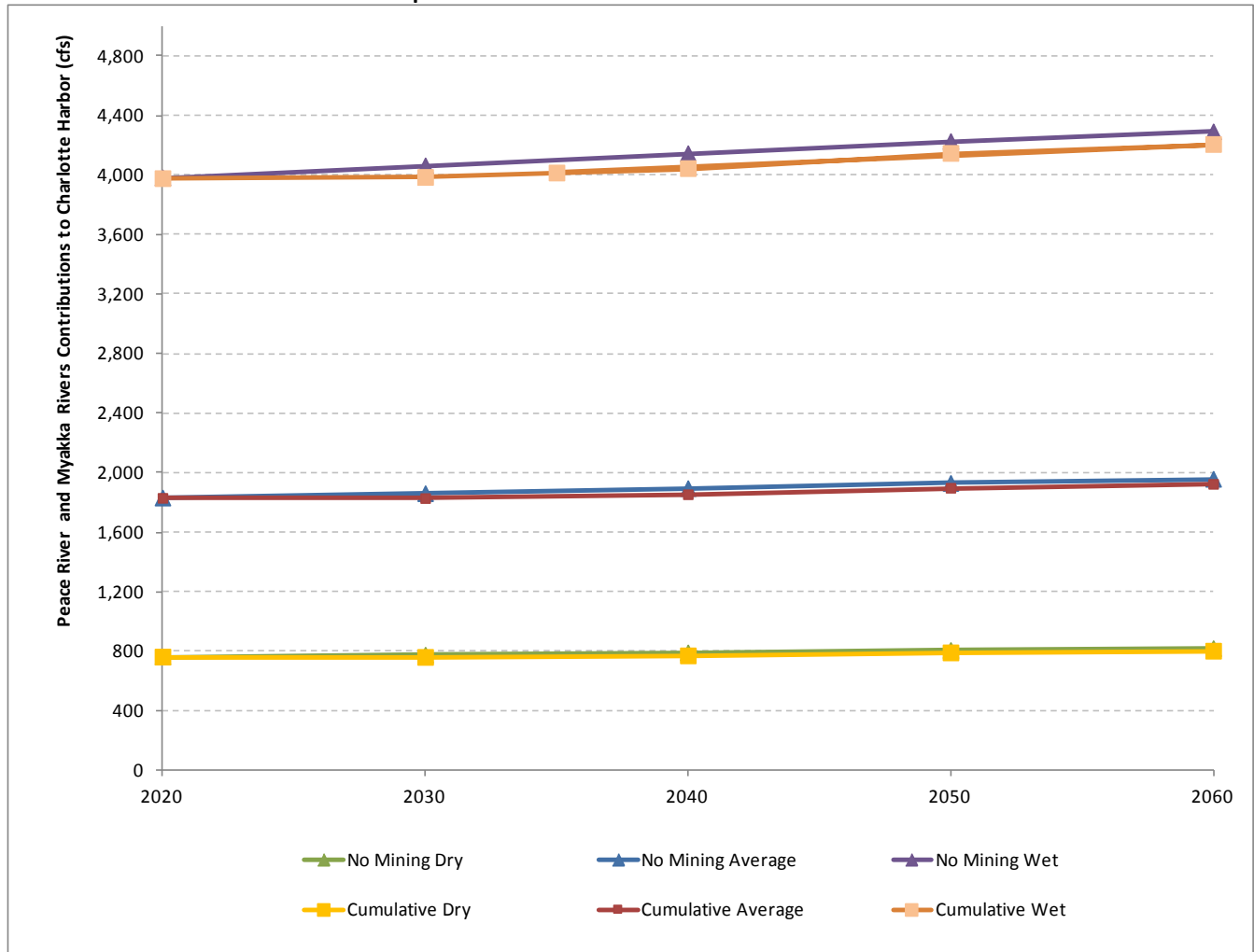


FIGURE 99

Peace River Contributions to Upper Charlotte Harbor Estuary Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without All Current and Foreseeable Actions

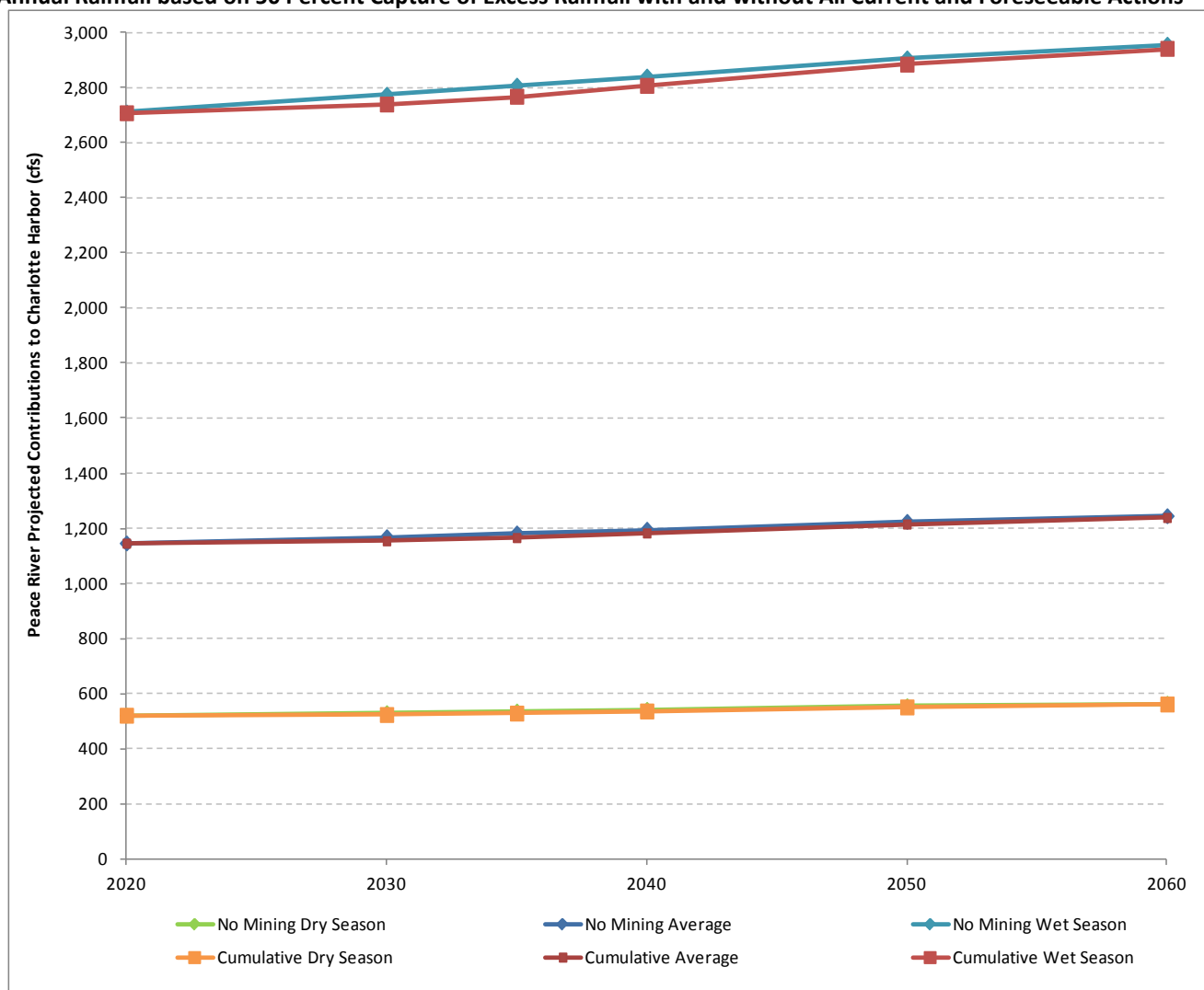


FIGURE 100

Peace River Contributions to Upper Charlotte Harbor Estuary Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without All Current and Foreseeable Actions

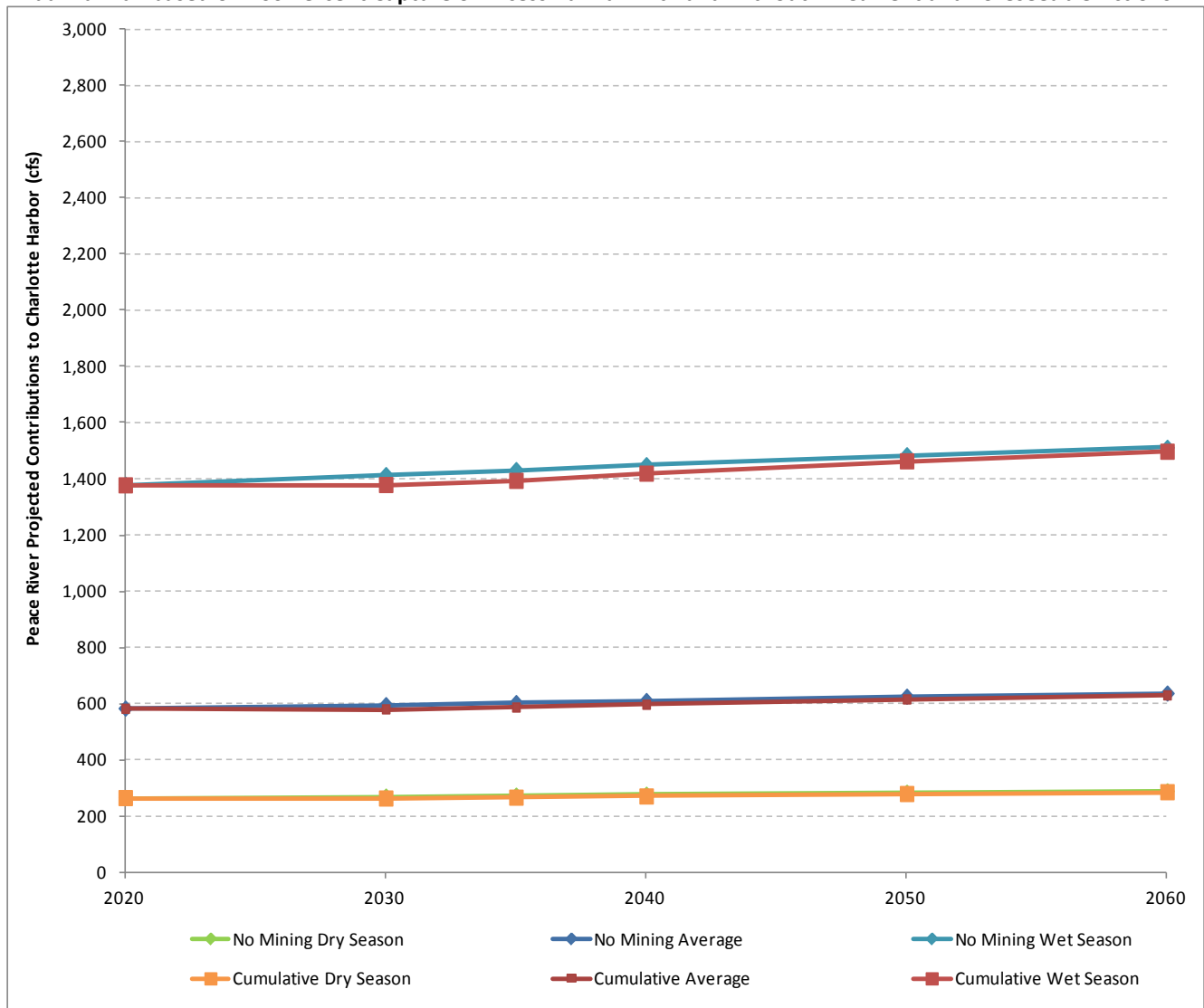
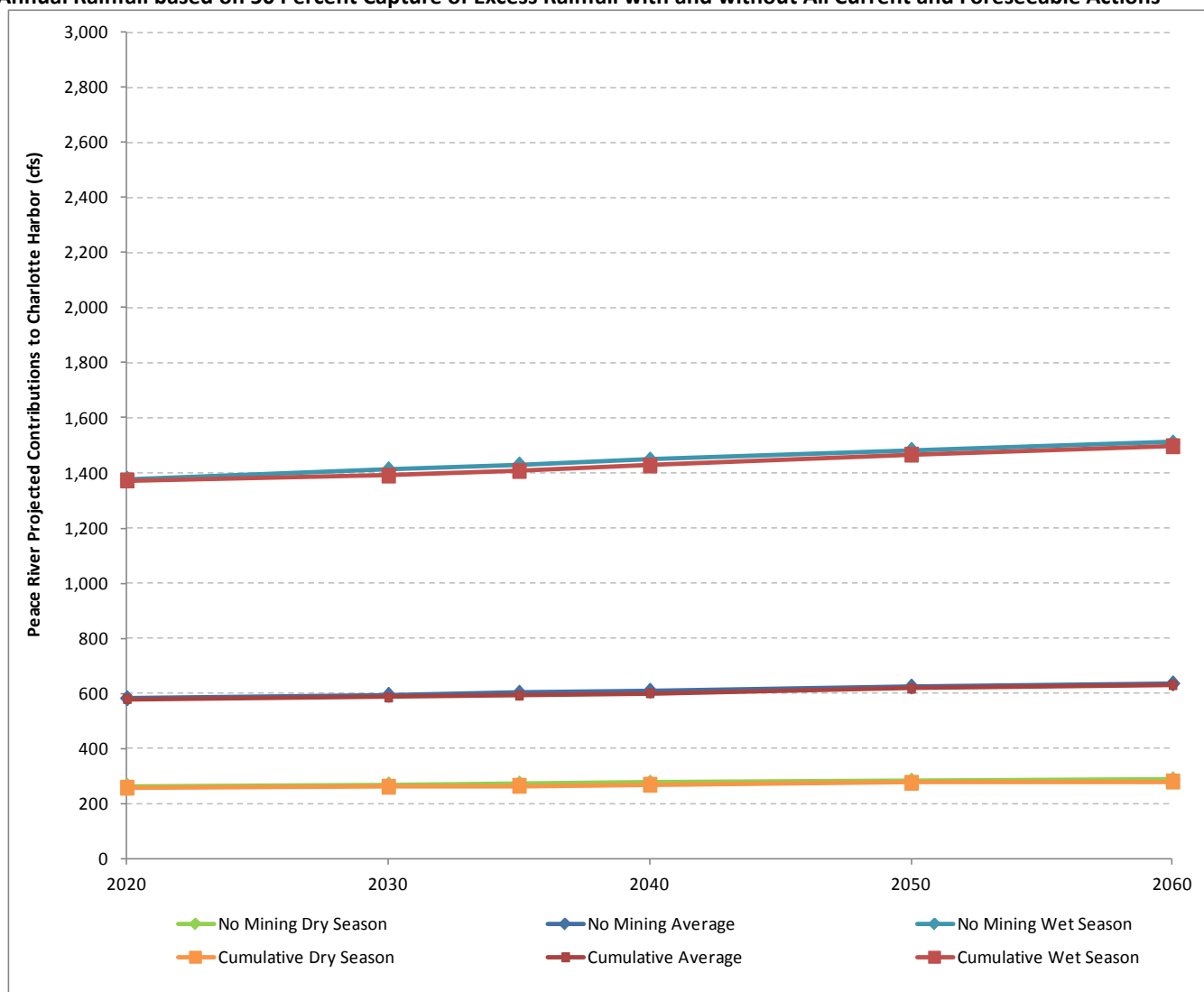


FIGURE 101

Peace River Contributions to Upper Charlotte Harbor Estuary Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without All Current and Foreseeable Actions



The largest influence on annual average flow from the Peace River watershed included in the estimate during low rainfall conditions were predicted between 2030 and 2040 based on the mine capture analyses. Based on 100 percent capture of stormwater, Peace River may have an average annual flow of approximately between 595 to 610 cfs without mining, and approximately 580 to 596 cfs with mining between 2030 and 2040. Assuming a 50 percent capture of stormwater, Peace River contributions to the upper Charlotte Harbor may have an average annual flow of approximately 588 to 603 cfs. This represents a decrease in flow of 7 cfs when compared to the No Action Alternative conditions. The MFL for the lower Peace River near the entrance to Charlotte Harbor is 130 cfs (based on monitored flows at Horse Creek, Peace River at Arcadia, and Shell Creek), which is lower than the predicted flow at the lowest 20th percentile annual rainfall. The three current actions and two foreseeable actions in this subwatershed have minor impact and are not expected to reduce flow by a level that could be easily detected when summed at the three USGS gages. This issue is examined further below in the context of water supply.

5.9.3.2 Myakka River Contributions to Upper Charlotte Harbor Cumulative Impact

Table 88 presents the Myakka River watershed (i.e., those areas in the computations) contributions to the upper Charlotte Harbor Estuary and percent change from 2009 seasonal and annual average flows for the 100 percent

capture of stormwater from the mining capture areas under average rainfall conditions (53 inches per year). The maximum influence was predicted to occur around 2055 according to the capture analysis, so an extra analysis was done for this year. Annual average flow increases by approximately 2 percent by 2055, dry season flow increases by approximately 3 percent, and wet season flow increases by approximately 2 percent from 2009 levels. Even when considering the one current action (Wingate East) and one reasonably foreseeable action (Pine Level/Keys Tract) within the Myakka River watershed, projected land use changes in this watershed result in increases in flow. By 2060 the Wingate East Extension would be reclaimed and only Pine Level/Keys Tract implemented as a mine extension would be in operation. The projected flows by 2060 on average increase by 3 percent, with an increase of 4 percent in the dry season, and an increase of 3 percent in the wet season when compared to 2009 flows.

TABLE 88

Projected Contributions to the Upper Charlotte Harbor Estuary and Percent Change from 2009 Flows during Average Rainfall Year and 100 Percent Capture with All Current and Foreseeable Actions within the Myakka River Watershed

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	675	0%	237	0%	1,253	0%
2020	683	1%	240	2%	1,270	1%
2030	689	2%	243	3%	1,284	2%
2040	684	1%	240	1%	1,265	1%
2050	692	2%	244	3%	1,285	3%
2055	691	2%	243	3%	1,280	2%
2060	697	3%	246	4%	1,294	3%

Table 89 presents the Myakka River watershed contributions to the Charlotte Harbor Estuary and percent change from 2009 seasonal and annual average flows for the 50 percent capture of stormwater from the mining capture areas under average rainfall conditions. The maximum influence was predicted to occur around 2055 according to the capture analysis. Annual average flow increases by approximately 4 percent by 2055, dry season flow increases by approximately 4 percent, and wet season flow increases by approximately 4 percent from 2009 levels. The projected flows by 2060 on average increase by 4 percent, with an increase of 5 percent in the dry season, and an increase of 5 percent in the wet season when compared to 2009 flows.

The same evaluation was performed for a low rainfall year (43 inches per year). Table 90 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 100 percent capture of stormwater in the capture area of the current and foreseeable actions within the Myakka River watershed. The maximum influence was predicted to occur around 2055 according to the capture analysis. Similar to the average rainfall scenarios, based on projected land use changes within the subwatershed and upstream subwatersheds, annual average flow increases by approximately 2 percent by 2055, dry season flow increases by approximately 3 percent, and wet season flow increases by approximately 2 percent from 2009 levels. By 2060, the projected annual average flow increases by 3 percent, with an increase of 4 percent in the dry season and an increase of 3 percent in the wet season when compared to 2009 flows. Similar to the average rainfall analysis, the changes in projected land use have a far larger effect on flow than mining.

TABLE 89

Projected Contributions to the Charlotte Harbor Estuary and Percent Change from 2009 Flows during Average Rainfall Year and 50 Percent Capture with All Current and Foreseeable Actions within the Myakka River Watershed

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	675	0%	237	0%	1,253	0%
2020	683	1%	241	2%	1,271	1%
2030	690	2%	243	3%	1,286	3%
2040	691	2%	244	3%	1,285	3%
2050	698	3%	247	4%	1,302	4%
2055	699	4%	247	4%	1,303	4%
2060	704	4%	250	5%	1,314	5%

TABLE 90

Projected Contributions to the Upper Charlotte Harbor Estuary and Percent Change from 2009 Flows during Low Rainfall Year and 100 Percent Capture with All Current and Foreseeable Actions within the Myakka River Watershed

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	548	0%	192	0%	1,016	0%
2020	554	1%	195	2%	1,031	1%
2030	559	2%	197	3%	1,042	2%
2040	555	1%	195	1%	1,027	1%
2050	561	2%	198	3%	1,042	3%
2055	561	2%	197	3%	1,038	2%
2060	565	3%	199	4%	1,050	3%

Table 91 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 50 percent capture of stormwater in the capture area of the current and foreseeable actions within the Myakka River watershed. The maximum influence was predicted to occur around 2055 according to the capture analysis. Similar to the average rainfall scenarios, based on projected land use changes within the subwatershed and upstream subwatersheds, annual average flow increases by approximately 4 percent by 2055, dry and wet season flow also increases by approximately 4 percent from 2009 levels. By 2060 the projected annual average flow increases by 4 percent for annual, and about 5 percent for dry and wet seasons when compared to 2009 flows.

To illustrate the effect on upper Charlotte Harbor Estuary contributions from most of the Myakka River under the conditions and scenarios evaluated, the results are presented graphically and compared to the No Action Alternative conditions. Figures 102 and 103 present the dry season, wet season and annual average flows calculated for the Myakka River with and without the current and foreseeable actions in operation for the 100 percent capture and the 50 percent capture cases, respectively, under average rainfall conditions.

TABLE 91

Projected Contributions to the Upper Charlotte Harbor Estuary and Percent Change from 2009 Flows during Low Rainfall Year and 50 Percent Capture with All Current and Foreseeable Actions within the Myakka River Watershed

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Percent Change from 2009 Flows
2009	548	0%	192	0%	1,016	0%
2020	554	1%	195	2%	1,031	1%
2030	560	2%	198	3%	1,043	3%
2040	560	2%	198	3%	1,042	3%
2050	566	3%	200	4%	1,056	4%
	567	4%	201	4%	1,057	4%
2060	571	4%	202	5%	1,066	5%

FIGURE 102

Myakka River Contributions to Upper Charlotte Harbor Estuary Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without All Current and Foreseeable Actions

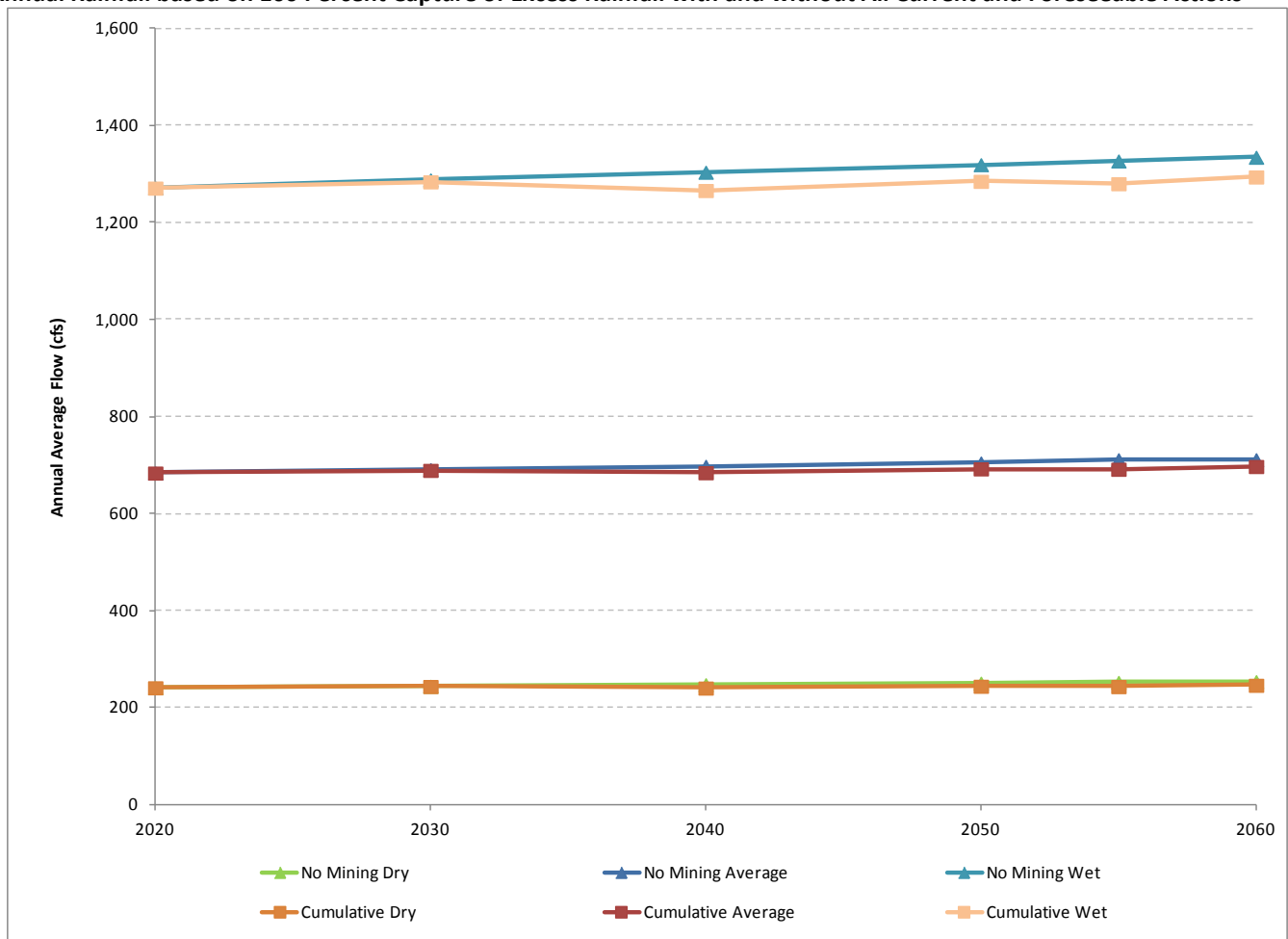
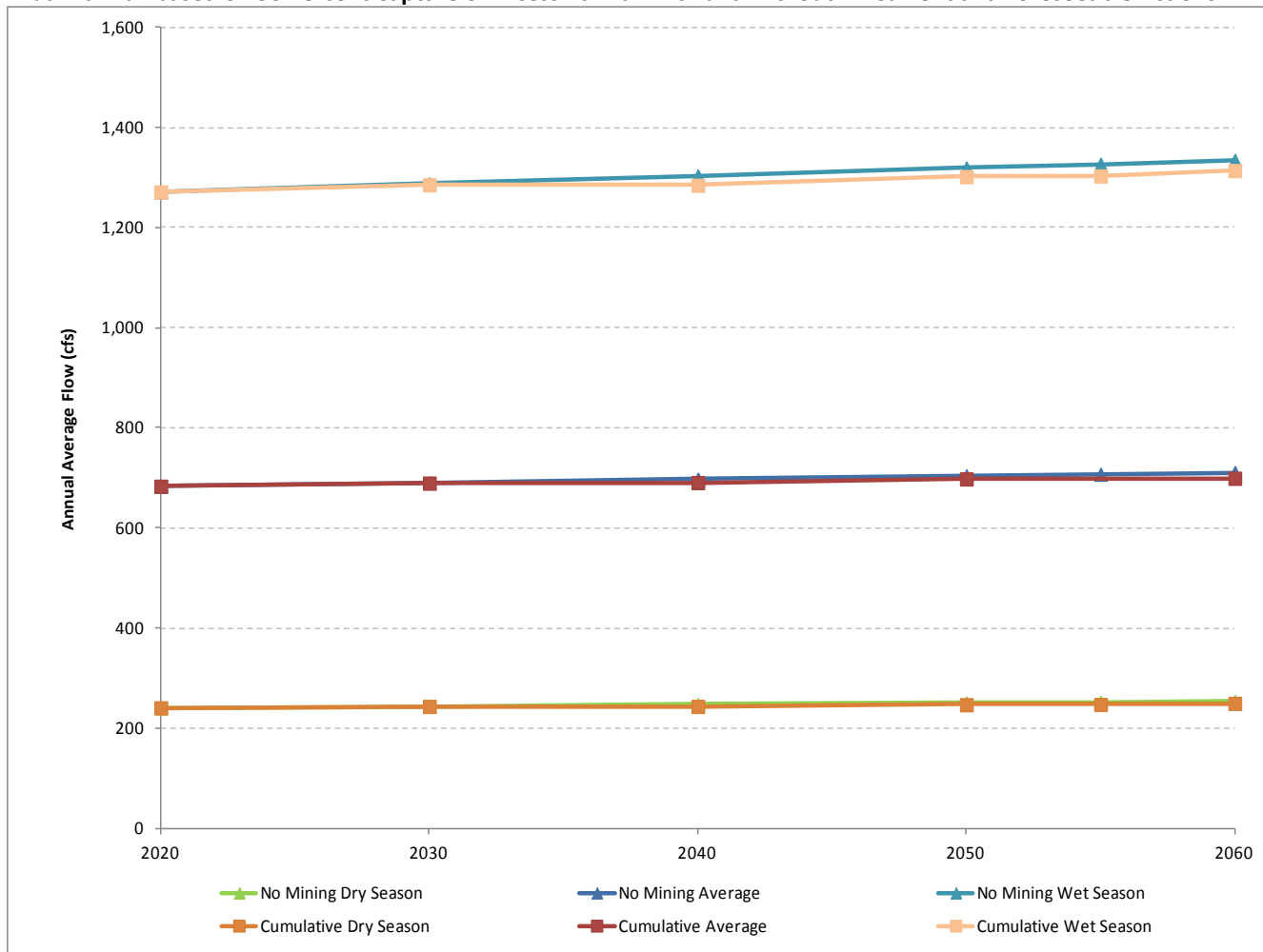


FIGURE 103

Myakka River Contributions to Upper Charlotte Harbor Estuary Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without All Current and Foreseeable Actions



The largest influence on annual average flow from the Myakka River watershed during average rainfall conditions were predicted around 2055 based on the capture analyses. Based on 100 percent capture of stormwater Myakka River contributions (from the area included) to the upper Charlotte Harbor may have an average annual flow of approximately 711 cfs without mining, and approximately 691 cfs with mining by 2055. Assuming a 50 percent capture of stormwater, the Myakka River may have an average annual flow of approximately 699 cfs. This means a reduction in flow of approximately 12 cfs when compared to the No Action Alternative conditions for average annual rainfall.

Figures 104 and 105 present the seasonal and annual average flows calculated for most of the Myakka River contributions to the upper Charlotte Harbor Estuary with and without the current and foreseeable actions based on 100 percent capture and 50 percent capture of stormwater respectively during low rainfall conditions.

FIGURE 104

Myakka River Contributions to Upper Charlotte Harbor Estuary Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without All Current and Foreseeable Actions

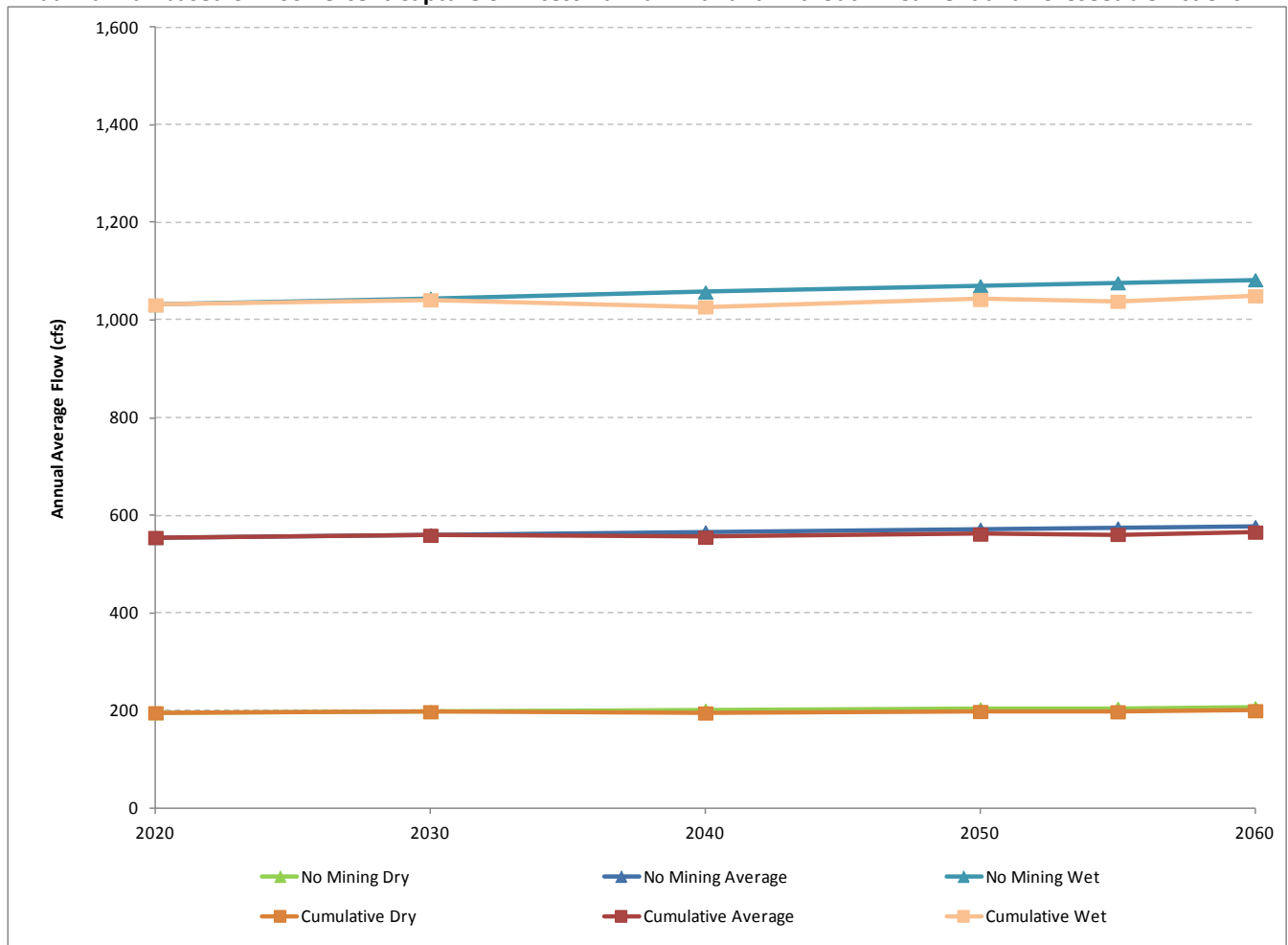
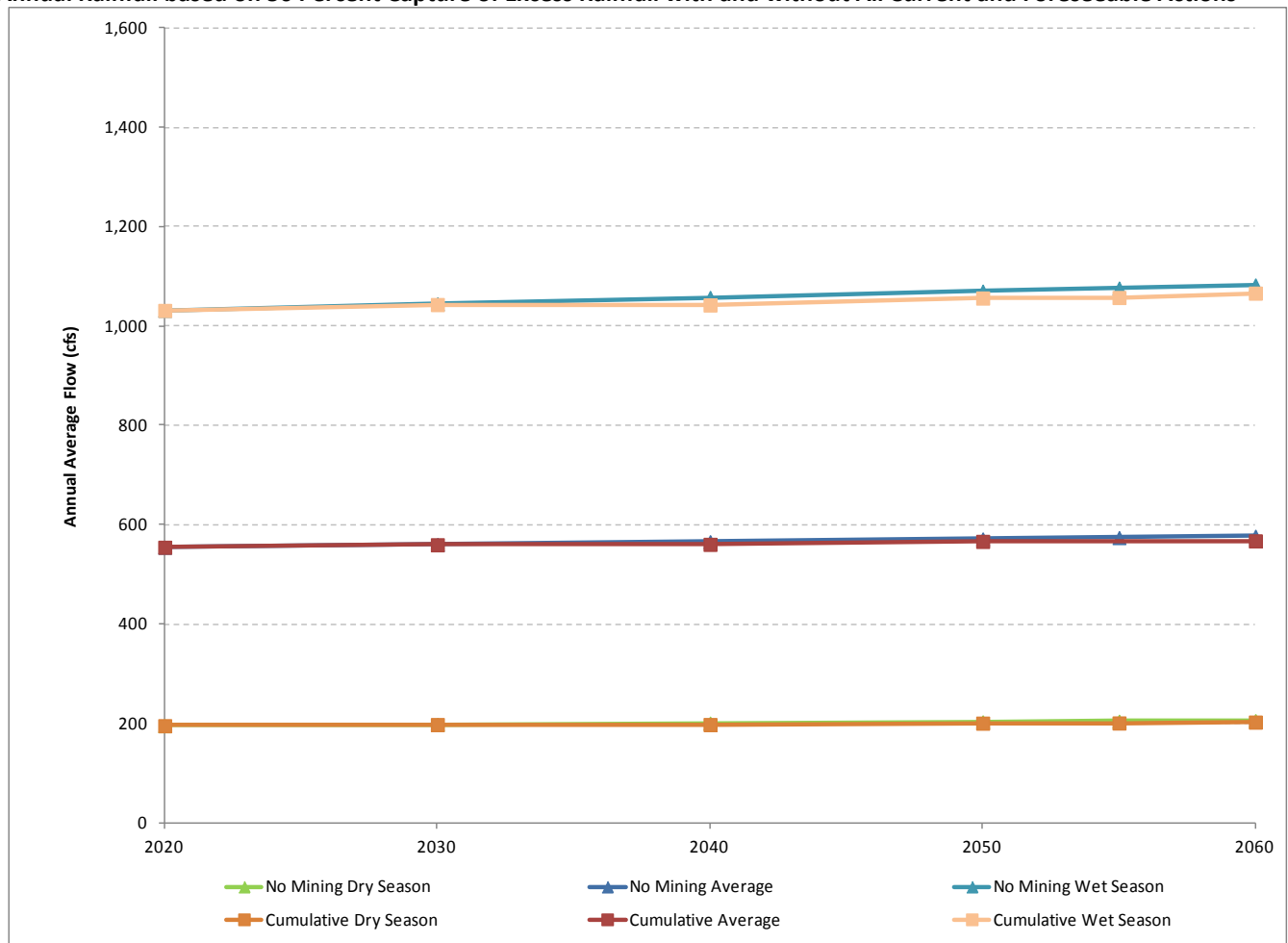


FIGURE 105

Myakka River Contributions to Upper Charlotte Harbor Estuary Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without All Current and Foreseeable Actions



The largest influence on annual average flow from the Myakka River watershed during low rainfall conditions were predicted around 2055 based on the mine capture analyses. Based on either the 100 or 50 percent capture of stormwater, the Myakka River may have an average annual flow of approximately between 574 cfs without mining, and approximately 561 cfs with mining by 2055. Assuming a 50 percent capture of stormwater, the Myakka River may have an average annual flow of approximately 567 cfs. This represents a decrease in flow of about 7 cfs when compared to the No Action Alternative conditions for low rainfall. MFLs have been established in the Myakka River watershed for only portions of the watershed and since the predicted flows are from multiple streams flowing directly into Charlotte Harbor, no direct comparison can be made.

5.9.3.3 Myakka and Peace River Combined Contributions to Upper Charlotte Harbor Cumulative Impact

Table 92 presents the total of the Myakka and Peace River contributions estimated (that is, most of these watersheds' area) to the upper Charlotte Harbor Estuary and percent change from 2009 seasonal and annual average flows for the 100 percent capture of stormwater from the mining capture areas under average rainfall conditions. The maximum influence was predicted to occur between 2030 and 2050 according to the capture analysis. Annual average flow increases by approximately between 2 to 6 percent during the period of 2030 and 2050, dry season flow increases by approximately between 2 to 5 percent, and wet season flow increases by approximately between 3 to 7 percent when compared to 2009 levels. Even when considering the four current actions and two reasonably foreseeable actions within the Myakka and Peace River watersheds, projected land use changes in these watersheds result in increases in flow. By 2060 most mines are reclaimed except for the two

foreseeable actions, Pine Level/Keys and Pioneer Tracts, which were evaluated as extensions to existing mines. The projected flows by 2060 on average increase by 7 percent, with an increase of 7 percent in the dry season and an increase of 8 percent in the wet season when compared to 2009 flows.

TABLE 92

Projected Contributions to the Charlotte Harbor Estuary and Percent Change from 2009 Flows during Average Rainfall Year and 100 Percent Capture with All Current and Foreseeable Actions within the Myakka and Peace River Watersheds

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	1,794	0%	747	0%	3,884	0%
2020	1,827	2%	760	2%	3,976	2%
2030	1,825	2%	758	2%	3,984	3%
2040	1,851	3%	768	3%	4,043	4%
2050	1,895	6%	788	5%	4,145	7%
2060	1,921	7%	800	7%	4,205	8%

Table 93 presents the combined rivers' contributions to the upper Charlotte Harbor Estuary and percent change from 2009 seasonal and annual average flows for the 50 percent capture of stormwater from the mining capture areas under average rainfall conditions. The maximum influence was predicted to occur between 2030 and 2050 according to the capture analysis. Annual average flow increases by approximately between 3 and 7 percent during the period of 2030 and 2050, dry season flow increases by approximately between 3 and 7 percent, and wet season flow increases by approximately between 4 and 8 percent from 2009 levels. Even when considering all four current actions and two reasonably foreseeable actions within the Myakka and Peace River watersheds, projected land use changes in these watersheds result in increases in flow. By 2060 the projected flows on average and during the dry season increase by 8 percent, with an increase of 9 percent in the wet season when compared to 2009 flows.

TABLE 93

Projected Contributions to the Charlotte Harbor Estuary and Percent Change from 2009 Flows during Average Rainfall Year and 50 Percent Capture with All Current and Foreseeable Actions within the Myakka and Peace River Watersheds

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	1,794	0%	747	0%	3,884	0%
2020	1,828	2%	761	2%	3,978	2%
2030	1,843	3%	766	3%	4,024	4%
2040	1,872	4%	779	4%	4,091	5%
2050	1,912	7%	797	7%	4,185	8%
2060	1,937	8%	808	8%	4,244	9%

The same evaluation was performed for a low rainfall year. Low rainfall conditions were estimated as the 20th percentile of the annual rainfall totals for the period of record (i.e., 80 percent of the years had higher rainfall). For both the Myakka and Peace River watersheds cumulative analysis, this calculation used 43 inches of rainfall per year.

Table 94 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 100 percent capture of stormwater in the capture area of the four current actions and two reasonably foreseeable actions within the Myakka and Peace River watersheds. The maximum influence was predicted to occur between 2030 and 2050 according to the capture analysis. Similar to the average rainfall scenarios, based on land use changes within the subwatershed and upstream subwatersheds, annual average flow increases by approximately between 2 to 5 percent during the period of 2030 and 2050, dry season flow increases by approximately between 2 to 6 percent, and wet season flow increases by approximately between 3 to 6 percent from 2009 levels. By 2060 the projected annual average flow increases by 7 percent, with an increase of 7 percent in the dry season and an increase of 8 percent in the wet season when compared to 2009 flows. Similar to the average rainfall analysis, the projected changes in land use have a far larger effect on flow than mining.

TABLE 94

Projected Contributions to the Charlotte Harbor Estuary and Percent Change from 2009 Flows during Low Rainfall Year and 100 Percent Capture with All Current and Foreseeable Actions within the Myakka and Peace River Watersheds

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	1,116	0%	451	0%	2,354	0%
2020	1,136	2%	459	2%	2,408	2%
2030	1,139	2%	460	2%	2,420	3%
2040	1,151	3%	465	3%	2,446	4%
2050	1,177	5%	476	6%	2,505	6%
2060	1,190	7%	482	7%	2,535	8%

Table 95 presents the flow and percent change from 2009 average annual and seasonal flows during a low rainfall year with 50 percent capture of stormwater in the capture area of the current actions and two reasonably foreseeable actions within the Peace and Myakka River watersheds. The maximum influence was predicted to occur between 2030 and 2050 according to the capture analysis. Similar to the average rainfall scenarios, based on land use changes within the subwatershed and upstream subwatersheds, annual average flow increases by approximately 3 to 6 percent during the period of 2030 and 2050, dry season flow increases by approximately 3 to 7 percent, and wet season flow increases by approximately 4 to 7 percent from 2009 levels. By 2060 the projected annual average and dry season flow increases by 8 percent, with an increase of 9 percent in the wet season.

TABLE 95

Projected Contributions to the Charlotte Harbor Estuary and Percent Change from 2009 Flows during Low Rainfall Year and 50 Percent Capture with All Current and Foreseeable Actions within the Myakka and Peace River Watersheds

	Annual Average Flow (cfs)	Annual Average Percent Change from 2009 Flows	Dry Season Average Flow (cfs)	Dry Season Average Percent Change from 2009 Flows	Wet Season Average Flow (cfs)	Wet Season Average Percent Change from 2009 Flows
2009	1,116	0%	451	0%	2,354	0%
2020	1,137	2%	460	2%	2,409	2%
2030	1,147	3%	464	3%	2,440	4%
2040	1,164	4%	471	4%	2,475	5%
2050	1,187	6%	482	7%	2,530	7%
2060	1,201	8%	488	8%	2,561	9%

To illustrate the effect on the upper Charlotte Harbor Estuary, contributions from the Myakka and Peace River watersheds included under the conditions and scenarios evaluated, the results are presented graphically and compared to the No Action Alternative conditions. Figures 106 and 107 present the dry season, wet season, and annual average flows calculated for the Myakka and Peace Rivers together with and without the four current actions and two reasonably foreseeable actions in operation for the 100 percent capture and the 50 percent capture cases, respectively, under average rainfall conditions.

The largest influence on annual average flow from the rivers' watersheds during average rainfall conditions were predicted to occur between 2030 and 2050 based on the capture analyses. Based on 100 percent capture of stormwater, most of the area contributions to the upper Charlotte Harbor may have an average annual flow of approximately 1,858 to 1,928 cfs without mining and approximately 1,826 to 1,894 cfs with mining between 2030 and 2050. Assuming a 50 percent capture of stormwater, the Charlotte Harbor Estuary may receive an average annual flow of approximately 1,843 to 1,912 cfs. This means a reduction in flow of approximately 15 to 16 cfs when compared to the No Action Alternative conditions with average rainfall.

Figures 108 and 109 present the seasonal and annual average flows calculated for the Myakka and Peace River contributions to the upper Charlotte Harbor Estuary with and without the four current actions and two reasonably foreseeable actions based on 100 percent capture and 50 percent capture of stormwater, respectively, during low rainfall conditions.

FIGURE 106

Myakka and Peace River Contributions to Upper Charlotte Harbor Estuary Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without All Current and Foreseeable Actions

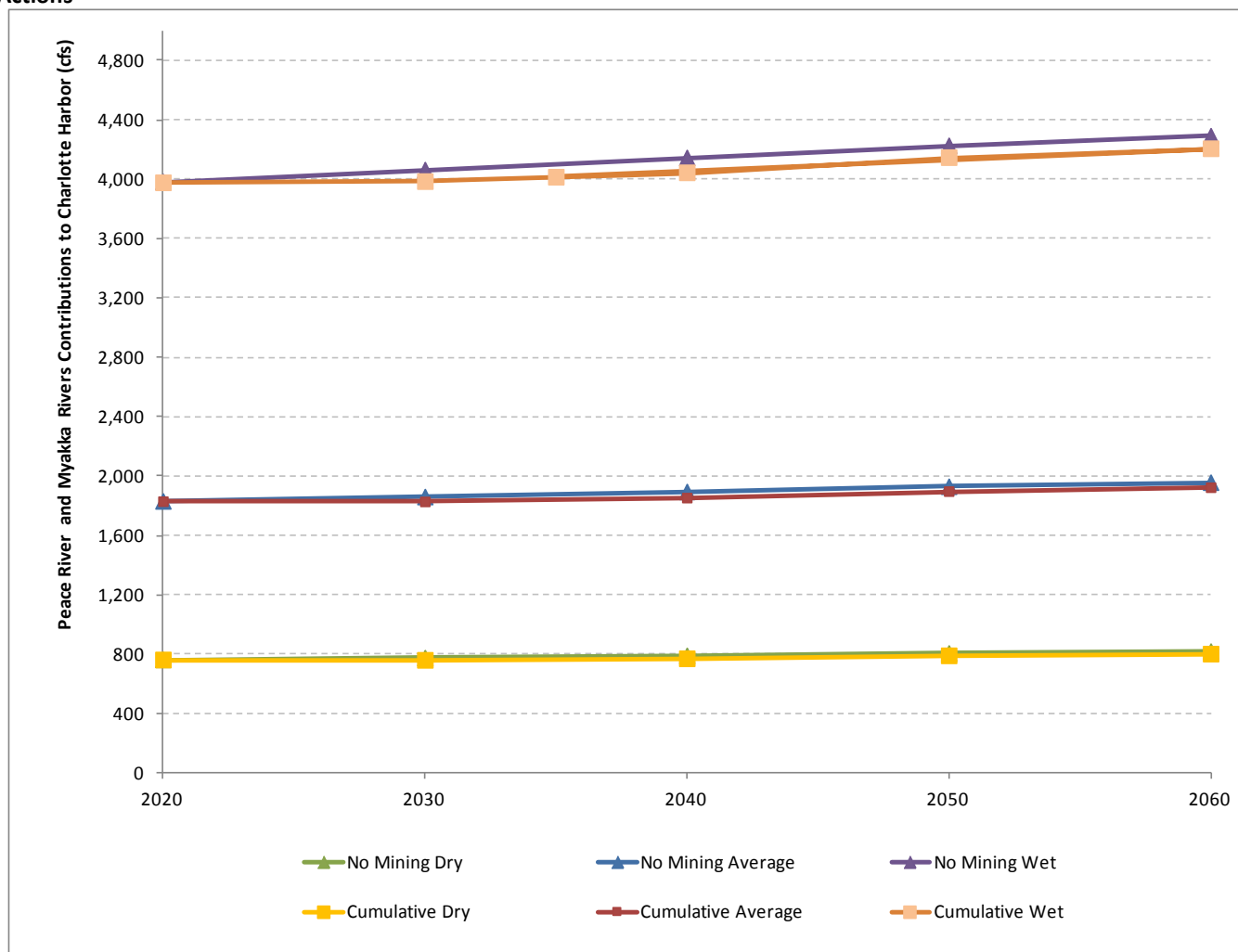


FIGURE 107

Myakka and Peace River Contributions to Charlotte Harbor Estuary Annual Average and Seasonal Projected Flows for Average Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without All Current and Foreseeable Actions

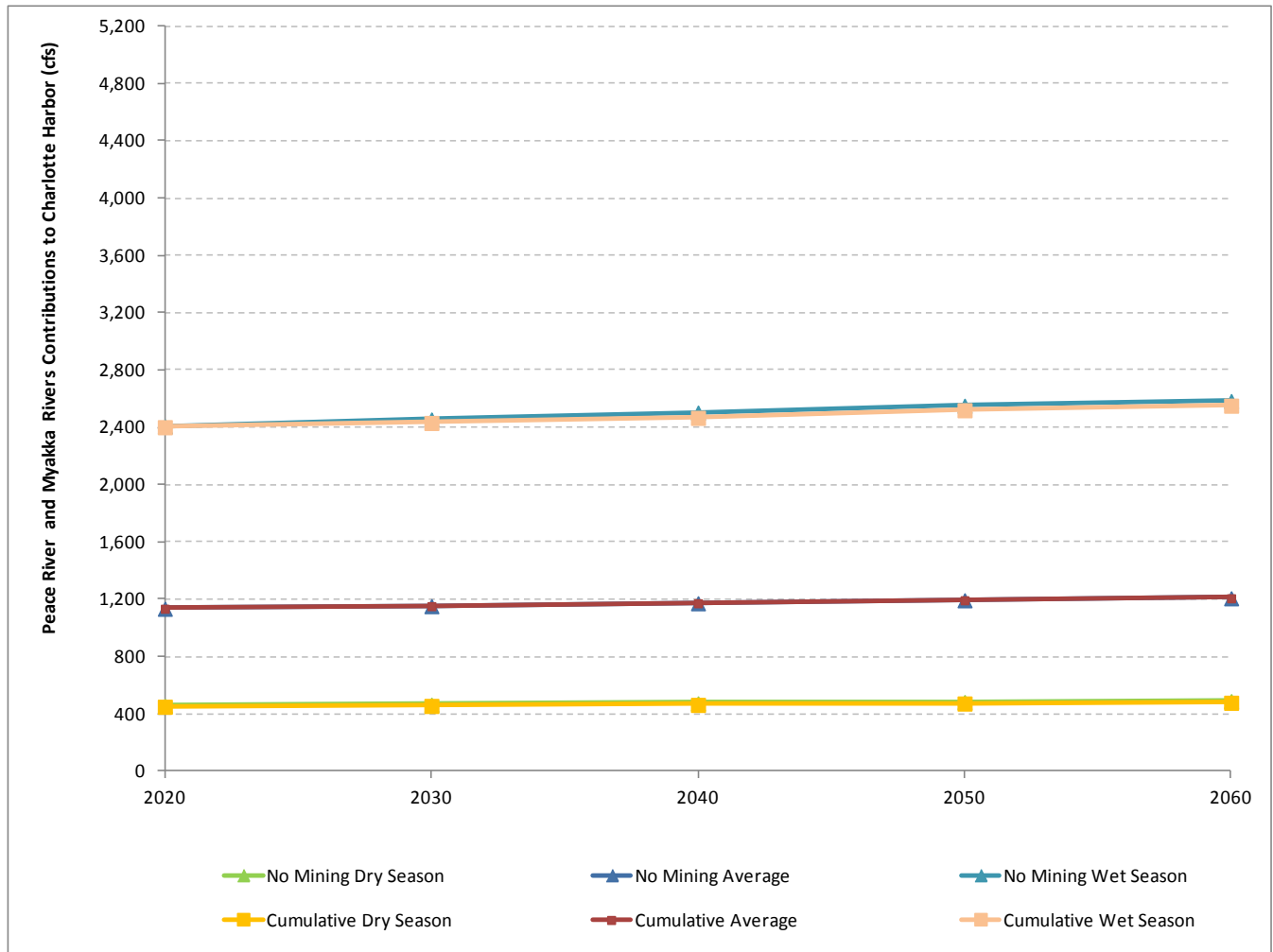


FIGURE 108

Myakka and Peace River Contributions to Charlotte Harbor Estuary Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 100 Percent Capture of Excess Rainfall with and without All Current and Foreseeable Actions

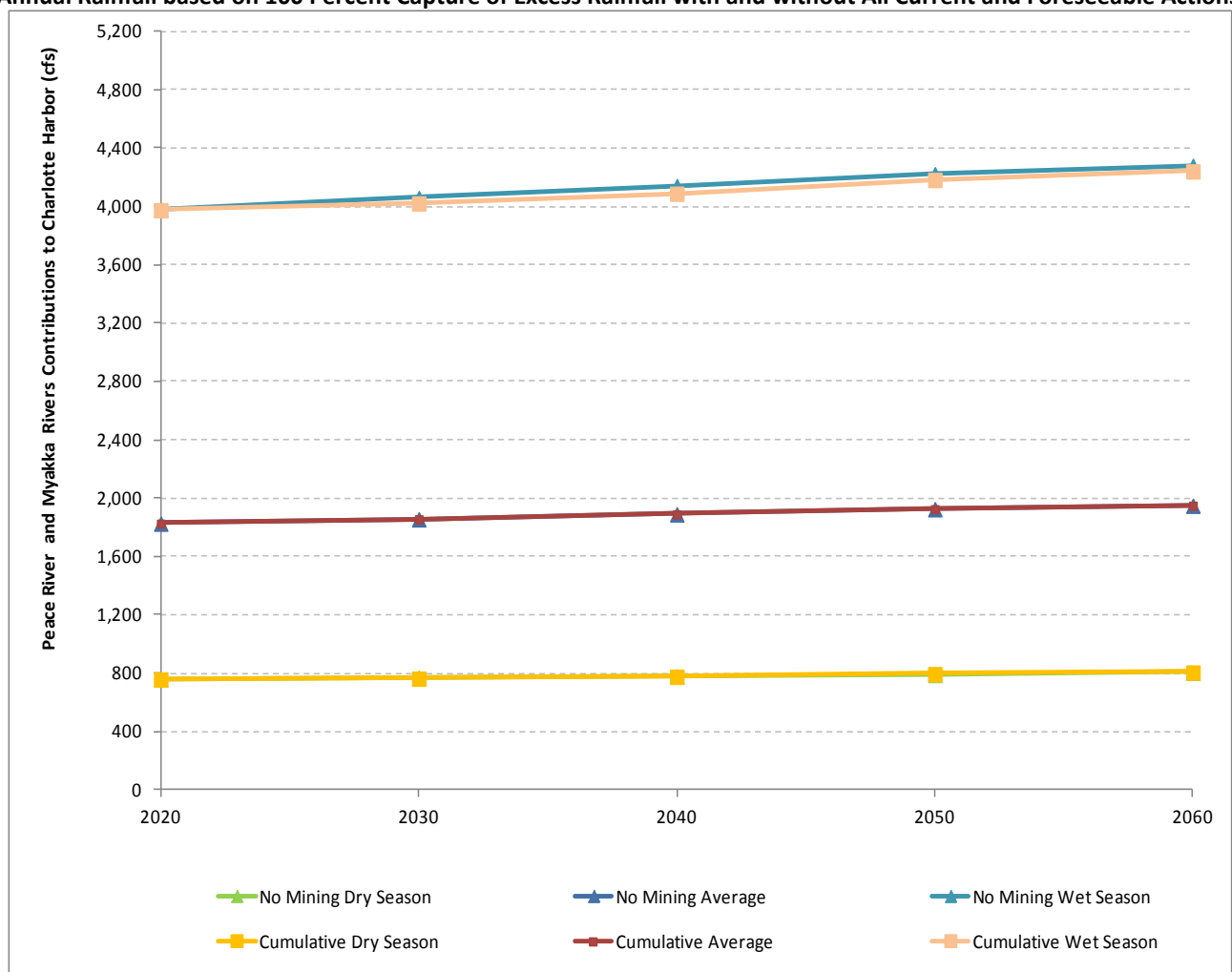
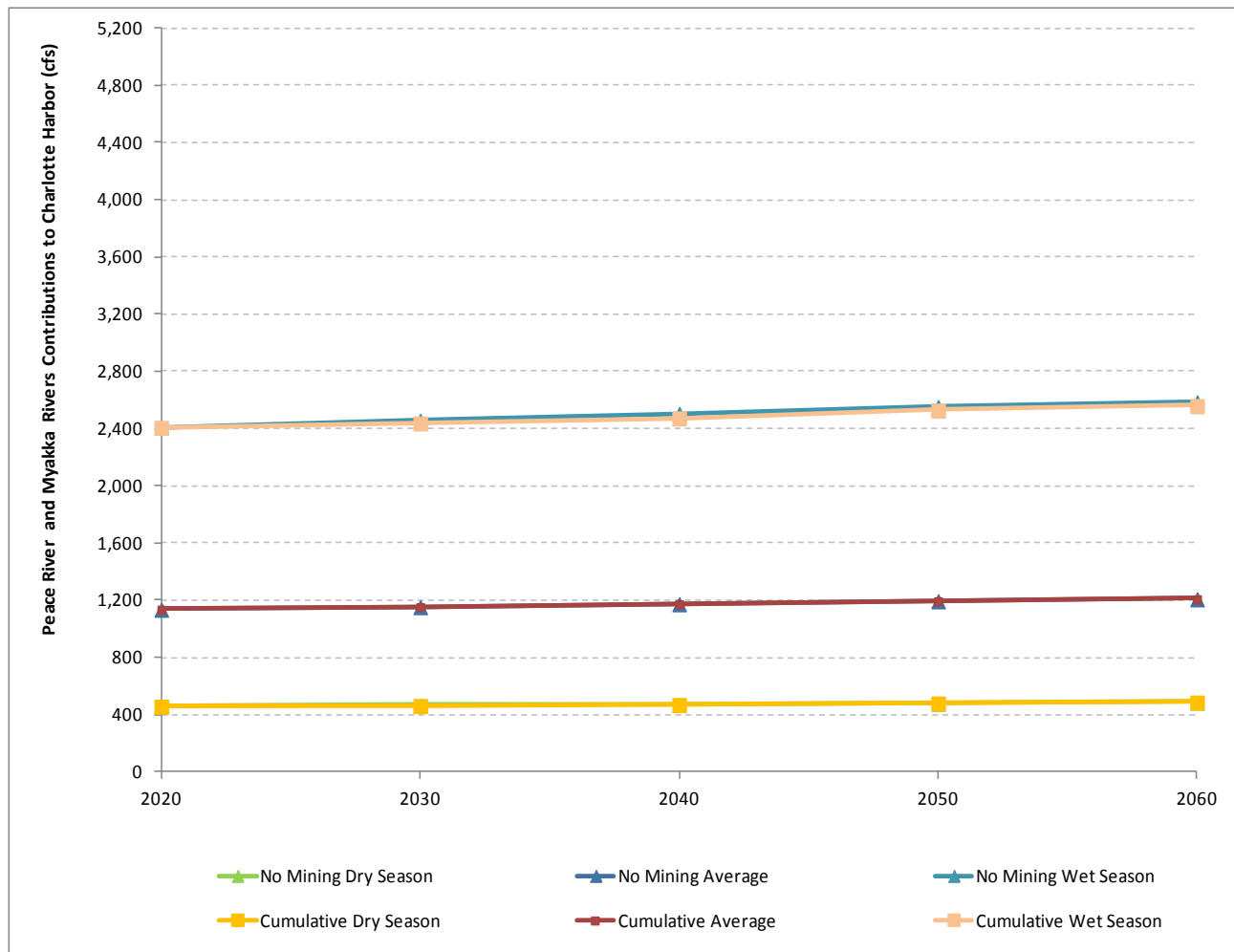


FIGURE 109

Myakka and Peace River Contributions to Charlotte Harbor Estuary Annual Average and Seasonal Projected Flows for Low Annual Rainfall based on 50 Percent Capture of Excess Rainfall with and without All Current and Foreseeable Actions



The largest influence on annual average flow from the rivers' watersheds during low rainfall conditions were predicted to occur between 2030 and 2050 based on the mine capture analyses. Based on 100 percent capture of stormwater, the estimated combined discharge into the upper Charlotte Harbor Estuary may have an average annual flow of approximately 1,155 to 1,196 cfs without mining and approximately 1,139 to 1,177 cfs with mining between 2030 and 2050 under low rainfall conditions. Assuming a 50 percent capture of stormwater, Myakka and Peace River contributions to Charlotte Harbor may have an average annual flow of approximately 1,147 to 1,187 cfs. This represents a decrease in flow of 8 to 11 cfs when compared to the No Action Alternative conditions with low rainfall.

6.0 Low Flow Effects at Surface Water Withdrawal Points

The amount of surface water available for withdrawal is directly linked to Florida's rules that require the water management districts to establish, as needed, MFLs. For creeks and streams, the minimum flow is protective of natural resources where they may be impacted by further water withdrawals that could cause significant harm to the water resources of the area and the related natural environment. As the use of groundwater expanded in southwest-central Florida to a level of concern, the southern and coastal communities started to utilize surface water to supplement their potable water supplies. There are two utilities that use surface water in the two watersheds where the Applicants' Preferred Alternatives or offsite alternatives are located: the Peace River Manasota Regional Water Supply Authority (PRMRWSA) (Peace River) and the City of North Port (Myakka River).

The MFLs studies are important references when evaluating flow rates to an environmentally significant threshold in the two major watersheds. These studies incorporated analysis of allowable withdrawals by the utilities and allowable withdrawals are part of the state rule (Chapter 40D-8,041, Florida Administrative Code). A substantial amount of analysis of the records already conducted in the two watersheds demonstrates that there is great variability between different tributaries and over periods of time. Relatively small changes in flow are difficult to quantify given the variability. SWFWMD establishes desired flow ranges as a percentage of a longer duration flow record. The process used to develop the MFLs and how the utilities operate their facilities (in their permits) is already impacted by continued mining (and other land uses such as agriculture and urbanization) in the watersheds. The effects of future mining from the Applicants need to be evaluated considering how the alternatives will differ from the historical record. This section reviews the MFLs applicable in these watersheds and the potential impact of the four Applicants' Preferred and offsite alternatives on these utilities' surface water supply.

6.1 MFL Review for Surface Water Intakes

The SWFWMD has looked at the water bodies and conducted extensive evaluations to set limitations in the utilities' water use permits. An MFL evaluation can be extensive and requires hydrologic and ecological study of potential effects of withdrawals at various levels. The Peace River has MFLs established at several points in the watershed, but only the limit near the PRMRWSA is discussed below because three Applicants' Preferred and Pioneer Tract Alternatives would be south of the Zolfo Springs gage and there are no other public water supply surface water withdrawals. Similarly, the Myakka River also has MFLs established on it, but not where North Port's intake is in the Big Slough Basin. A brief summary of the flow limits that affect the two utilities is presented here.

The PRMRWSA has a freshwater withdrawal near the downstream end of the Peace River, before the salinity in the estuary influences the water quality to a point that may affect treatment requirements. Their withdrawal is limited to higher flow rates and the utility has an aboveground reservoir and aquifer storage-recovery system (a type of underground reservoir) to extend their supply through dry periods. The proposed MFLs on the lower Peace River have not been codified into rule (SWFWMD MFL website lists latest status). The SWFWMD plans to re-evaluate the MFLs for the lower Peace River by 2015 (SWFWMD, 2010c). The SWFWMD determined from an empirical analysis that a low flow threshold of 130 cfs for the sum of the flows at three USGS gages (Peace River at Arcadia, Joshua Creek at Nocatee, and Horse Creek near Arcadia) will maintain freshwater at the PRMRWSA treatment plant intake location. The MFL report lists the amount of flow that can be withdrawn from the Peace River for water supply (up to a maximum yet to be determined [but up to 400 cfs was evaluated, SWFWMD, 2010c]). The PRMRWSA withdrawal rate is based on a percentage of the previous day's flow and the pumping rate cannot exceed the difference between the sum of the flow less 130 cfs. The percentage of water that can be withdrawn varies during the year as separated into three time blocks, but the 130-cfs low river flow limit does not change. For example, from April 20 through June 25 the PRMRWSA can take 16 percent of the sum of the three gages' flow rates on the next day. So, if there is 175 cfs sum of average daily flow on April 25, then PRMRWSA can withdraw 28 cfs (16% of 175 cfs) on April 26, leaving 147 cfs remaining (i.e., $175 - 28 = 147$ cfs). But, if there is a 140-cfs sum of average daily flow on May 1, 16 percent is 22.4 cfs. The utility cannot remove more than 10 cfs on May 2 because that is what is available over 130 cfs ($140 - 130 = 10$ cfs < 22.4 cfs).

According to the SWFWMD Regional Water Supply Plan (SWFWMD, 2010a), the Peace River at the PRMRWSA plant has available water about 320 days per year, with a range between 152 and 365 days per year. They listed the current permit average annual limit as 32.8 million gallons per day (mgd, 50.7 cfs), but only about 14.9 mgd (23.1 cfs) is being used. The available unpermitted water (to all users) in the Peace River was listed as 80.4 mgd (124.4 cfs), but that could not be actually used unless there is substantial storage because much of that water occurs resulting from short-duration, very wet periods. The PRMRWSA does have substantial storage, but a water supply system needs to look at all components of its system (e.g., intake structure, distribution system) to determine if there is sufficient capacity to meet its needs. Additional storage and other infrastructure would be needed to take advantage of available wet season surface water in excess of the existing permitted limits.

The City of North Port water supply facility is the only permitted public water supply surface water withdrawal in the Myakka River watershed. North Port can withdraw surface water from Myakkahatchee Creek and the

Cocoplum Waterway, but Myakkahatchee Creek is the primary water source (near U.S. 41) with the Cocoplum used only as a back-up source (SWFWMD, 2010b). North Port's facility is linked to the water supply system of the PRMRWSA and the City can receive treated potable water from the PRMRWSA or transfer treated water to it. During times of low flow, the City discontinues withdrawals from Myakkahatchee Creek because of reduced water quality (sulfates) in the creek and receives treated water from the PRMRWSA. The City's permit has a withdrawal limit tied to flow measurements near the intake. There are extensive canals in the urban area that are interconnected and affected by tidal conditions. The historical gage record near North Port is limited; however, the flow measurement devices in this area have been in reliable operation only since 2007.

North Port's withdrawals from Myakkahatchee Creek cannot exceed an annual average rate of 4.4 mgd and a peak month average rate of 6.6 mgd, which are equivalent to flow rates of 6.8 and 10.2 cfs, respectively. The City's 2006 permit required that maximum daily withdrawal rates be linked to the rate of flow in the creek. Daily withdrawals cannot exceed 2.08 mgd (3.2 cfs) when flows at the diversion structure are less than 10 cfs, 4 mgd (6.2 cfs) when flows are between 10 cfs and 30 cfs, and 6 mgd (9.3 cfs) when flows are greater than 30 cfs. There is no MFL on Myakkahatchee Creek because of a lack of historical monitoring data. The SWFWMD plans to revisit the establishment of a MFL when the lower Peace River is re-evaluated in 2015 (SWFWMD, 2010b). For practical purposes, the threshold low flow limit for North Port's intake is 10 cfs. As predicted earlier, the low rainfall year (lowest 20th percentile) estimated average annual flow on the order of 176 cfs with a dry season flow around 100 cfs. The potential impact from a conceptual mine plan for the Pine Level/Keys Tract Alternative was about 5 to 6 cfs, so the flow impacts here are expected to be minor. However, because of the lack of observed data, MFLs, and mine plans, there is higher uncertainty of potential impacts at this location.

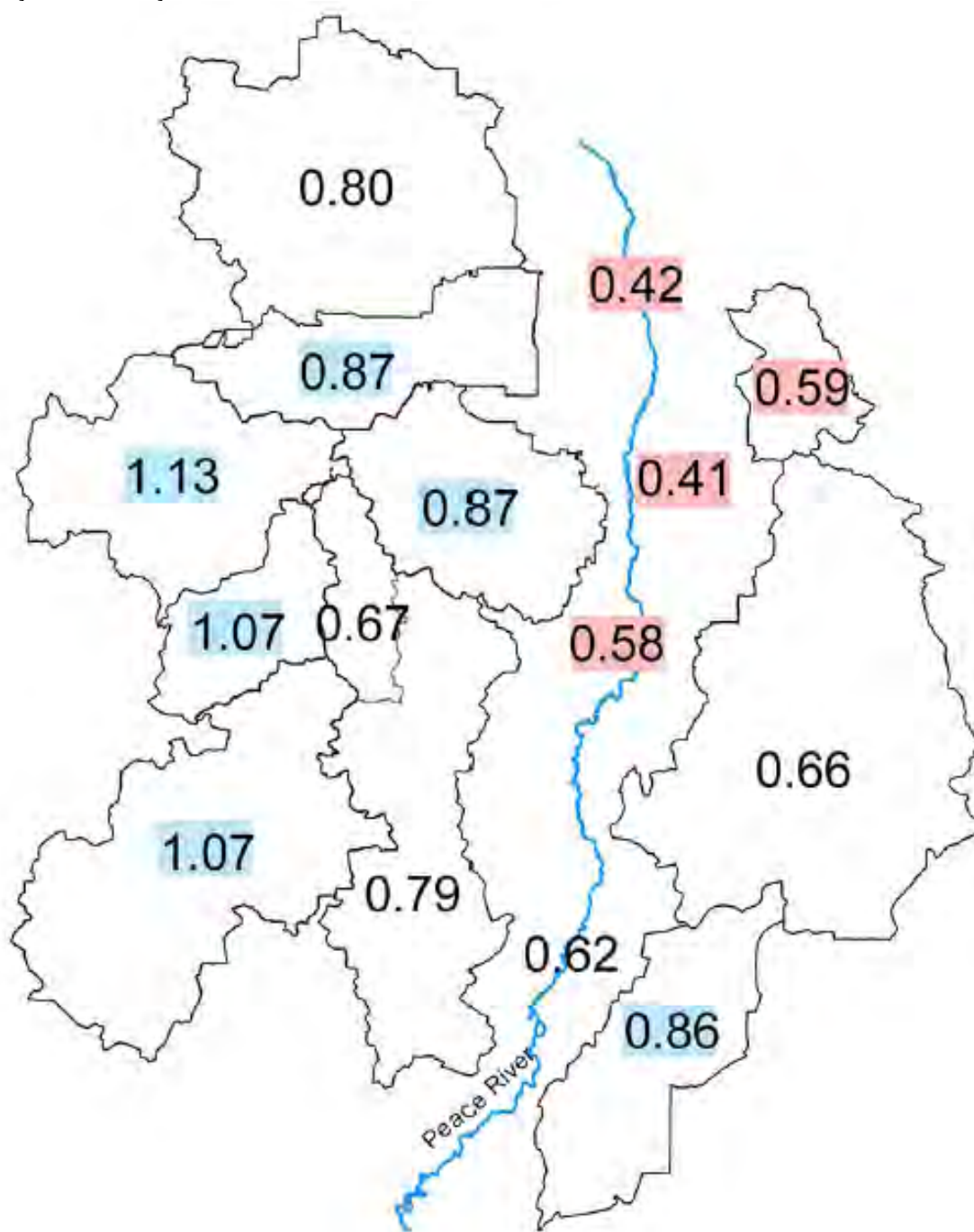
6.2 Variance in Surface Water Delivery from Various Tributaries

While the flow analyses presented above in Section 5 focused on seasonal and annual runoff values, the withdrawals are tied to daily low flows. This section presents an analysis of the low flows based on observed data. The SWFWMD Water Supply Plan (2010a) noted that the variability of available water in the Peace River is high. Depending on the period of record utilized, the hydrologic water balances vary (PBS&J, 2007). While the predicted surface water delivery utilizing runoff coefficients and future land use conditions was useful in evaluating relative trends in annual and seasonal flows, the monitored record of flows is better suited in evaluating the alternatives affect on the daily low flow thresholds.

Historically, most phosphate mining has occurred to the north and is moving toward the southern portions of the CFPD. This is important in this discussion because the amount of surface water delivered (i.e., stormwater runoff, seepage, and groundwater) varies across the watersheds. It is well documented by Metz and Lewelling (2009) and others that flow in the upper Peace River (upstream of the Fort. Meade USGS gage) is affected by karst conditions where portions of streams may drain underground to the upper FAS. Yet further south, these conditions change and the groundwater potentiometric surface (i.e., potential level that confined groundwater in the upper FAS would rise to if unconfined; a measure of pressure) and the ground surface are closer to each other and thus there is a generally higher potential for groundwater discharge (SWFWMD, 2001b). The amount of clay in the soils of the SAS and the thickness of the intermediate FAS also affect how much surface water is delivered from each tributary in the watersheds (Duerr et al., 1988).

Schreuder (2006) analyzed USGS data over 20 years and estimated the unit runoff for the study area, as shown in Figure 110. The low unit streamflow data for the main stem of the Peace River reflects the low yield from the upper Peace River (north of Zolfo Springs). There is a general gradient of low to higher unit streamflow as one moves from the higher topography in the upper Lake Wales region on the east side to the lower elevations on the Coastal Plain to the west and south.

FIGURE 110

Unit Streamflow Derived from Observed Flow Data from 1980 through 2000 in the Central and Southern CFPD*Unit streamflow listed in cfs/m*

(Source: Schreuder [2006], Figure 24; colors on original figure were not explained.)

A relationship between the interactions of surface water with the underlying aquifer is addressed by the USGS in multiple studies in the Peace River watershed (Lewelling and Wylie, 1993; Lewelling et al., 1998; Metz and Lewelling, 2009; and Lee et al., 2010). The SWFWMD has conducted several comprehensive analyses of the river watersheds in the region, including the Alafia River, Peace River, and upper Myakka River. The Alafia and Peace River studies (SWFWMD, 2005a, and PBS&J, 2007, respectively) led the SWFWMD to conclude that river flows prior to the 1970s were affected by phosphate mine discharges. Schreuder (2006) also noted a distinct change in unit streamflows after the mid-1970s. In general, the change in water use by the phosphate mining industry in the 1970s reduced the industry's reliance on groundwater (by capturing stormwater). Although if one plots flow over

time since the 1970s, the flows trend downward, indicating *prima facie* that there was a reduction in surface water delivery (SWFWMD, 2005a). In the Alafia and upper Peace River regions, this reduction is partially a result of the phosphate industry reusing water onsite and eliminating the discharge of the spent groundwater. Once return flows were discounted, reductions in stream flow correlated to the Atlantic Multidecadal Oscillation (AMO) cycle.

The monitored flows in the Myakka River watershed have not decreased over time; however, this is partially a result of limited data and increased agriculture land use. Sources of flows during low flow periods can include groundwater baseflow or other discharges. These other discharges are typically from irrigated agriculture, which has recently become increasingly prevalent. Groundwater is pumped for irrigation, especially during droughty periods, and some drainage from the fields is discharged. Therefore, additional review of the monitoring data was conducted for various periods of time.

6.3 Difference in Low Flow Days based on Monitored Daily Data

Several studies have examined average annual flow trends, as discussed above, but fewer literature sources about low flow days are available. These types of discussions utilize probability distributions, where the daily flow is sorted and plotted as a fraction of days over the study period with flows greater than a given value. This can be done using flows (cfs), unit flows (cfs/m), or normalized flows (daily flow divided by the average flow). Garlanger (2002) presented a flow chart where the distribution of percent time flow exceeded a given unit flow rate was plotted for various tributaries; the results were similar to those of Schreuder (2006) except the distribution quantifies the range more effectively than averages. In 2011, Garlanger (2011) presented similar plots utilizing the normalized flows to demonstrate changes between time periods. Normalizing the flows accounts for the change resulting from differences in trends, such as the AMO step function (i.e., groups of years with high or low average flows). Garlanger (2011) noted that there has been little change in the Peace River at Arcadia gage data when normalized through 1996 (last year plotted). Mining began in the upper Peace River watershed around 1890, so this time period included both old and new mines with various practices.

The AEIS team reviewed the USGS data for various time periods. The four most relevant gages in the study area are the three of interest in the PRMRWSA withdrawal permit and the upper Myakka River gage (insufficient flow data for North Port). The period of record of these four gages were analyzed, as well as the last 30 years of data broken down into two 15-year periods. Table 96 provides the average, median, and lowest 10th percentile daily flow data for these gages for various time periods. The average can indicate broad-scale trends (e.g., annual), but the median (50 percent of readings higher and lower) and the lowest 10th percentile are better indicators of the magnitude of low daily flows. A lower median flow means that half of the days were lower by comparison. Similarly, for two periods of essentially the same length of time, a lower 10th percentile value means that there were more days with lower flows.

There are differences in results depending on the location of the gage. Starting with the Peace River at Arcadia gage, which has the longest period of record in Table 96, there was a period of high rainfall and flows through the mid-1960s. The data presented for daily flow from 1934 to 1963 demonstrate this in all three metrics (average, median, and 10th percentile). However, the last 30-year record has lower averages, which is expected in the drier period of the 30-year AMO cycle, as documented by others (SWFWMD, 2005a; Kelly, 2004). When the last 30 years are broken into two 15-year periods, the last 15 years (1997 to 2011) have higher average flows, but lower median and much lower 10th percentile flows. To identify the changes in land use that may have contributed to these differences, a plot of the active mining area is shown in Figure 111. This plot shows that the total acreage under active mining decreased after 1996 by about 38 percent. Therefore, the capture of stormwater in current active mines is unlikely to cause lower flow conditions than in the 15 years prior to this, when mining acreages were at their peak. Furthermore, the active mining area is a small fraction of the 2,350-mi² Peace River watershed (about 2.66 percent at 40,000 acres of active mining, assuming all is in that watershed).

Further examination of the other gages shows results that differ from the Peace River Arcadia gage. At Horse Creek, the average, mean, and lowest 10th percentile are similar for the period of record (1952 to 2011) and the two 15-year periods between 1982 and 2011. In Joshua Creek, a tributary subwatershed with no mining, the

metrics that reflect low flow conditions are much higher in the last 30 years than over the entire period; the most recent 15-year period flow metrics are all higher, even though the average annual values are similar to other periods. The high low flows monitored in Joshua Creek and perhaps Horse Creek could be attributed to an increase in irrigated agriculture (SWFWMD, 2010b; PBS&J, 2007). Since the last 15 years have the lowest rainfall years in the record (see Attachment A) and include significant low flow periods, it stands to reason that drainage from irrigated crops would be high in droughty conditions. For example, in the upper Myakka River, where the irrigation return flow is a documented concern (SWFWMD, 2005b), the 10th percentile flow was much higher in the 1982 to 1996 period but closer to average in the past 15-year period (1997 to 2011). Consequently, the dry conditions may have reduced surface water delivery but increased daily flow supplemented by the irrigation return flows.

Figure 112 illustrates the plots of the four relevant gages' normalized flow (daily flow divided by the average for the given period). In these plots, the low flows have a range of results that demonstrate variability around the period of record line, except for Joshua and Horse Creeks, where the lower flows fall to the right of the line. As demonstrated previously in this TM, there is a broad range of flow rates recorded over time. Upon inspection of the annual rainfall amounts in Attachment A for Polk, Hardee, and DeSoto Counties, the rain has been more variable in the last 15 years than in the 15 years prior to that. However, when the entire record of rainfall is reviewed, there is even more variability in annual precipitation earlier in the record than in the recent period, especially during the higher rainfall years prior to 1970. One standard deviation above and below the mean since 1980 was plotted previously because it contains about 70 percent of the monitoring results since the current groundwater conservation practices went into effect, but that also leaves about 30 percent outside that range so the actual data are more variable than is visibly evident in the predicted flow plots in Section 5. Given the naturally high variability in runoff/daily flow and relatively small footprint of mining when compared to agriculture and urban uses, it is difficult to attribute flow variations to specific mining practices in the whole watersheds when more specific studies of tributaries with and without mining do not support a similar conclusion (Lewelling and Wylie, 1993; Schreuder, 2006; Garlanger, 2002).

TABLE 96

Average, Median, and 10th Percentile Flows at Selected USGS Gages in Area of Interest

USGS Gage	Time Period	Average (cfs)	Median (cfs)	Lowest 10th Percentile (cfs)
Horse Creek Near Arcadia	1952-2011	190	45.0	3.7
	1982-1996	179	51.0	5.3
	1997-2011	199	40.0	4.5
Peace River Near Arcadia	1934-2011	1,054	449	110
	1934-1963	1,318	578	141
	1982-1996	868	417	112
	1997-2011	943	341	57
Joshua Creek Near Nocatee	1950-2011	109	29	4.8
	1950-1963	121	18	1.5
	1982-1996	111	38	11
	1997-2011	121	38	14
Myakka River Near Sarasota	1970-2011	236	90	6.7
	1982-1996	251	114	15
	1997-2011	248	82	6.5

FIGURE 111

Approximate Acreage of Mining in the CFPD Study Area: Past (historical and not reclaimed to date), Present (active mines), Applicants' Preferred Alternatives (per applications) and Pine Level/Keys and Pioneer Alternatives (foreseeable, per AEIS)

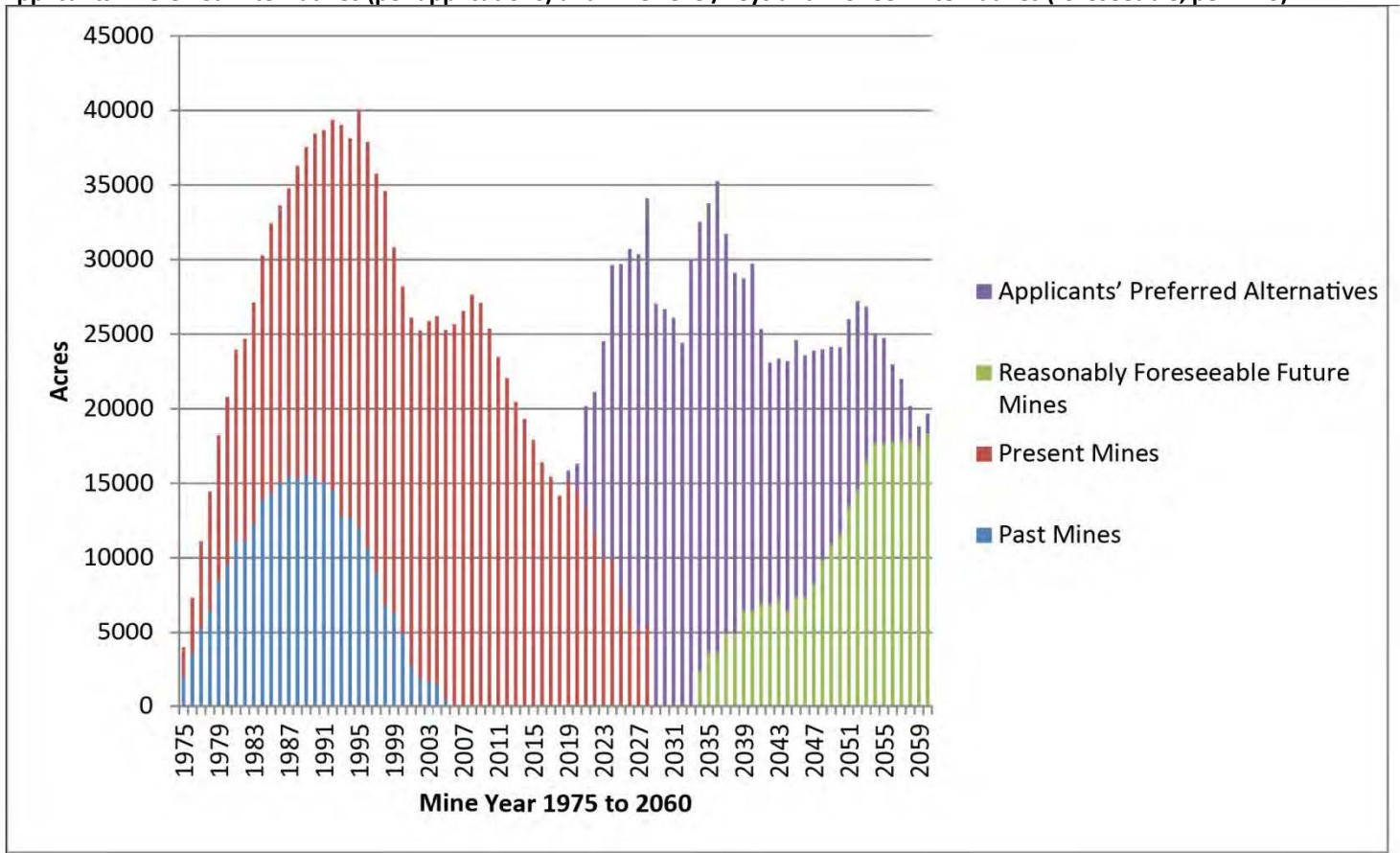
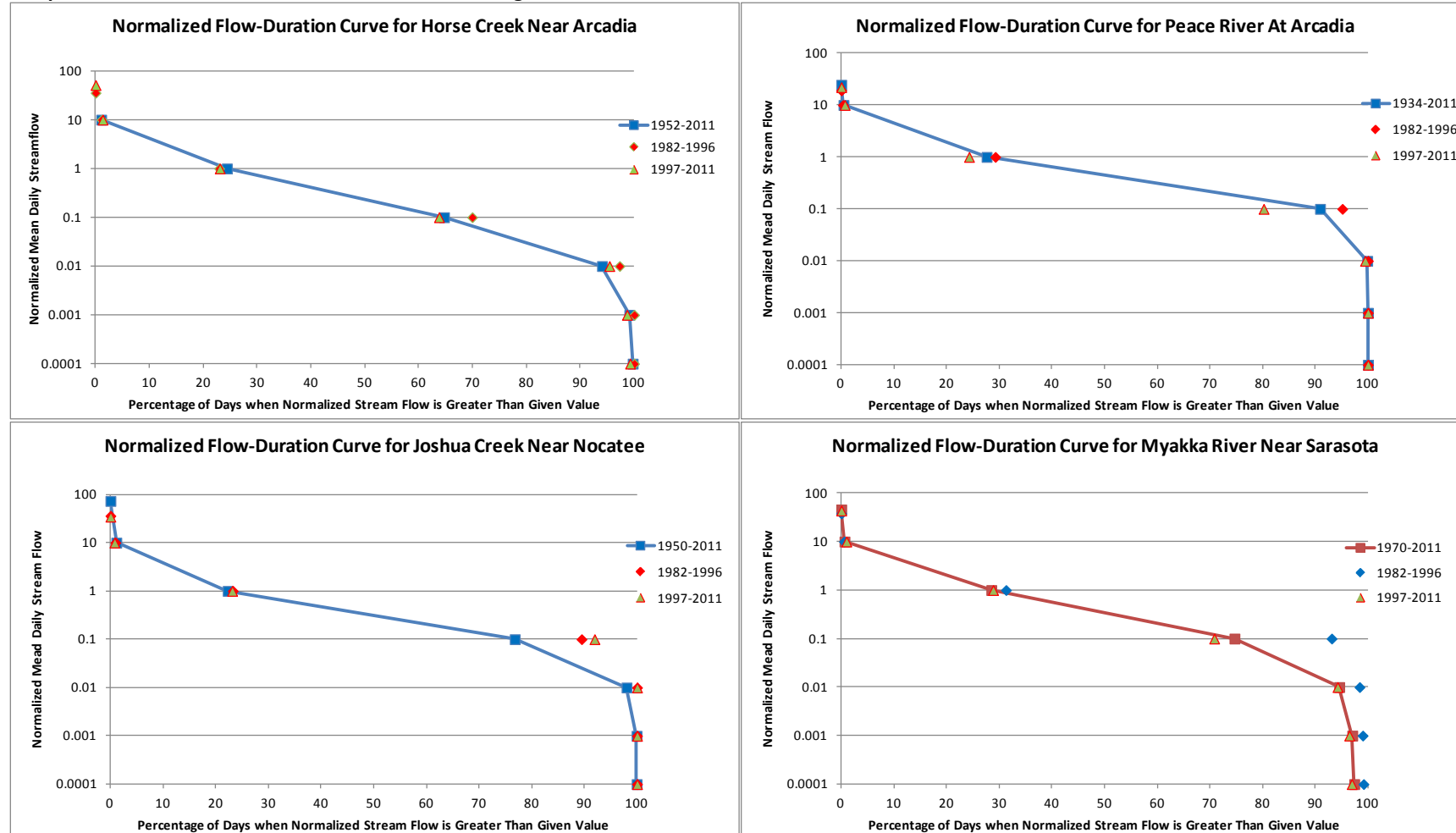


FIGURE 112
Comparison of Flow Distributions of Selected USGS Gages in the Southern CFPD



Note: Normalized by the Long-Term Average Daily Flow over the Referenced Time Frame

6.4 Potential Magnitude of Impacts from Mining

This section provides a bounding analysis of the maximum potential reduction in the low flow days at the PRMRWSA intake. As shown in Figure 107, the level of active phosphate mining has varied somewhat over the past 35 years, but is now at about 20,000 acres, down from a peak of nearly 40,000 acres. These acreages are an approximation of the amount of land that may capture and reuse stormwater. New mining from the Applicants' Preferred Alternatives would continue at a level of about 25,000 to 30,000 acres per year. Since rules pertaining to reclamation are stringent and require more stream restoration than prior to 2005, it also stands to reason that future reclamation would be at least as effective as reclamation in those areas recently mined and released. It likewise stands to reason that any effects from mining phosphate are already included in the flow record and that the utilities that rely on surface water supply already deal with the high variability in flow. Furthermore, as land use change to more urbanization or by converting pasture to row crops, more flow is expected to reach the lower Peace River both on an annual and seasonal basis (Section 5). In addition, as one moves into the southern portion of the CFPD, the relative surface water delivery increases (see Figure 106); therefore, reductions in contributing drainage area may have a somewhat higher effect downstream.

When scientists simulate the hydrologic response of future or alternative cases, the rainfall is typically held constant while land use and/or other parameters in the model are changed. A water balance simulation is typically based on a continuous time series of precipitation⁹ record that ranges from 1 to 10 years depending on the complexity of the model and objectives. For example, the Peace River Cumulative Impact Study (PBS&J, 2007) simulated the hydrology over 3-year continuous rainfall periods selected from four periods in time to capture the results of differing rainfall amounts. To estimate into the future, the AEIS team would typically rely on historic rainfall data, although there are some stochastic rainfall prediction models available. Instead of trying to simulate rainfall/runoff for a hypothetical future condition, a simpler bounding method was applied to the USGS daily data in the Peace River for the PRMRWSA intake location. The same methodology cannot be applied to the North Port intake because of a lack of flow data¹⁰.

The availability of surface water is most critical during times of drought, and the worst cases are during extended droughts. The utility can withdraw water during higher flow periods and store excess pumped water for times of drought. The PRMRWSA has both surface and underground reservoirs for storage. As discussed previously, the permit for surface water is related to a low flow threshold of 130 cfs, based on the sum of the three USGS gages at Horse Creek, Joshua Creek, and Peace River at Arcadia. This flow level is roughly near the lowest 10th percentile flow of these gages under recent conditions (not counting the most recent drought). Therefore, the change in the number of days with surface water available for withdrawal would occur near the period of low surface water delivery. It would be expected that the active mines would be retaining most of the surface water during these times (notwithstanding the percolation from the ditch and berm systems to hydrate adjacent wetlands). Consequently, the maximum effect that the active mines could have is to remove the expected contribution from the area being actively mined (i.e., the 100 percent capture case) and to assume no increase in flow resulting from land use change (i.e., use the historic recorded flow data). To develop a conservatively high estimate of flow reduction, the USGS daily flow at the intake (i.e., the sum of three gages) was reduced by the fraction of the maximum potential future mined area in the lower Peace River. Also, because of the variation in the flow record, several time periods were discussed.

The estimated area of land captured under the mine plans for the three Applicants' Preferred Alternatives (Desoto, Ona, and South Pasture Mine Extension) and foreseeable offsite alternatives (Pioneer and Pine Level/Keys) peaked at just under 30,000 acres (29,449 acres in year 2036), with 24,635 acres in Horse Creek and

⁹ While some studies use daily rainfall, short time interval data are required if peak runoff rates are of interest. The more complex infiltration subroutines also require short-duration rainfall for best results (e.g., 15-minute duration or shorter). A long-term record of short-duration rainfall data is normally less available than daily records.

¹⁰ Because the USACE has not received a formal application for phosphate mining in the Big Slough Basin, there is not an immediate requirement to analyze the effect on North Port's water supply. However, the site of a foreseeable mine, Pine Level/Keys Tract, is primarily in the Big Slough Basin. An evaluation of effects on the City of North Port's water supply should be conducted at the time an application is submitted to USACE (or FDEP).

only 4,814 acres in the Peace River at Arcadia subwatershed. The maximum area actively captured in each of these tributaries at any given time is 25,172 and 7,848 acres in the Horse Creek and Peace River at Arcadia gages, respectively. While a maximum of about 30,000 acres (with maximum mine area in both tributaries' added in 2036) is only 2.1 percent of the Peace River watershed, these locations are south of Fort Meade. In times of drought, the flow in the upper Peace River may not contribute further south because of low groundwater and river flow conditions (Metz and Lewelling, 2009). If one subtracts all drainage area north of the Zolfo Springs gage on the Peace River, then the maximum area captured is about 3.1 percent of the lower Peace River subwatersheds. Furthermore, some tributaries are expected to have higher surface water delivery than others (see Figure 106 and Table 4). The long-term adjustment factor (j , Table 4) used in estimating annual runoff is a measure of the relative contribution of different subwatersheds. When the maximum potential active mine area is weighted by j , then the relative importance of these mined areas to the overall contributing area rises to an equivalent of 3.8 percent ($3.8/3.1 = 1.22$, or a 22 percent increase).

A summary the daily flow record reported on a monthly basis is presented in Table 97. The four time periods included in the table are:

- 1980 through 2011: The period of record after the ditch and berm systems started to be utilized for new mines
- 2009 through 2011: The latest 3-year period
- 1997 through 1999: A period looked at in the Cumulative Impact Study (PBS&J, 2007)
- 1998 through 2003: A period reviewed by the Peace River Integrated Model Study (the lowest rainfall in record occurred in 2000)

The average flow per month for these four periods is presented in Table 97. From these results, distinct dry and wet seasons are apparent, but the flow during March in the dry season is double the flow from the other dry months. In the recent dry period (2009 through 2011), the dry months' flows were especially low. The 1997 through 1999 period was relatively wet and the 6-year 1998 through 2003 period was not very low either, on average, except for the April and May months.

The tally of the number of days with flow below the MFL threshold of 130 cfs was divided into two parts: number of days with flow less than 130 cfs over the reported time period, and the number of days with flow less than 130 cfs decreased by 3.8 percent. Table 98 lists the number of days with reported flow less than 130 cfs. From this portion of the table (reported USGS flow data without reductions), three observations are of interest. First, the longer 32-year period has an average annual value of about 54 days per year with flows less than the threshold, and again there is high variability because the standard deviation in this statistic is 57.3, or a coefficient of variation of 105 percent (i.e., standard deviation divided by mean = 1.05). Second, the other three time periods evaluated vary above and below the average, so different periods of analysis will give a range of answers, as expected from the review of various literature sources. Finally, there were no days in September when the flow in the lower Peace River dropped below 130 cfs.

The number of low flow days changed when the recorded flow was reduced by 3.8 percent. The total number of days with flows under the threshold is listed in Table 99. The difference in the averages over the four periods is about 3.7 days, or rounded to 4 days per year, with a range of about 2 to 5 days per year. Again, by using the USGS flow data, some impact from past and existing mining is already included in the record and so this would be a conservative estimate of future conditions (not counting for the release of existing mine areas).

TABLE 97

Average Daily Flow per Month for the Peace River near the PRMRWSA

Peace River Average Flow (cfs)				
Month	1980-2011	2009-2011	1997-1999	1998-2003
January	731	349	1,764	1,492
February	780	381	2,407	1,396
March	1,013	591	2,797	1,605
April	625	605	734	493
May	275	288	296	181
June	1,215	497	571	1,621
July	1,680	1,470	1,287	2,191
August	2,147	1,658	1,356	2,167
September	2,794	2,169	1,629	3,653
October	1,392	1,037	1,995	1,596
November	677	297	1,998	644
December	661	397	1,914	941
Grand Annual Average	1,167	814	1,559	1,498
No. of Years in Column's Data	32	3	3	6

Note: Analysis is based on the sum of 3 USGS gages used by PRMRWSA

TABLE 98

Estimate of Number of Low Flow Days in the Peace River with the USGS Flow Record

Month	1980-2011	2009-2011	1997-1999	1998-2003
January	150	31	4	31
February	113	15	0	38
March	187	45	27	68
April	258	30	41	82
May	431	39	17	104
June	197	26	11	49
July	41	0	4	17
August	2	0	0	0
September	0	0	0	0
October	36	0	0	12
November	142	4	0	30
December	185	14	0	31
Grand Total	1,742	204	104	462
Days per year (Average)	54.4	68.0	34.7	77.0
Standard Deviation	57.3			

Analysis is based on the Sum of 3 USGS gages used by PRMRWSA

TABLE 99

Estimate of Number of Low Flow Days in the Peace River with the USGS Flow Record Reduced by 3.8 Percent

Month	1980-2011	2009-2011	1997-1999	1998-2003
January	162	31	7	31
February	124	17	3	39
March	201	48	32	70
April	271	30	41	86
May	447	42	18	106
June	202	26	13	52
July	47	0	4	18
August	2	0	0	0
September	0	0	0	0
October	44	0	0	12
November	161	6	0	30
December	199	14	0	31
Grand Total	1860	214	118	475
Days per year (Average)	58.1	71.3	39.3	79.2
Difference in Days per Year from Part A (i.e., more days)	3.7	3.3	4.7	2.2

Analysis is based on the Sum of 3 USGS gages used by PRMRWSA

Another limitation of this analysis is that it is not an operations study of the PRMRWSA storage and treatment systems. While water may be available in the river, the full capacity of the withdrawal pumping system may not be utilized if the storage is full later in the wet season. For example, if a reduction in flow prevents pumping that may have occurred in April and May by 4 days, the utility may be able to pump more water later in September or October to make up that volume in their reservoir. The PRMRWSA has a complex water supply system that involves multiple communities and is, or has plans to be, integrated with the City of North Port, Sarasota, and Punta Gorda systems (HDR Engineering, Inc. [HDR], 2008). A detailed operations study is beyond the scope of the AEIS. However, another analysis of the potential pumped volume was applied to the USGS flow data.

The PRMRWSA has withdrawal limits within its water use permit that allow withdrawals of varying amounts depending on the flow (as reported by the SWFWMD MFL study, 2010c). These limits were applied to the two data records (observed and observed less 3.8 percent) for the 1998 through 2003 time period (6 years). This time period was selected because it included a mixture of high and low flows. The pumping capacity of the Peace River intake was limited to 185.6 cfs (120 mgd), the current capacity of the structure. The reduction in volume available for withdrawal given the existing permit limits and a 3.8 percent flow reduction was 98.7 percent of the volume could be pumped with no reduction in flow (or, a 1.3 percent volume reduction; not a 1:1 reduction in volume pumped). Over this 6-year period, this reduction in volume averaged about 0.85 mgd if all of the available water allowed in the PRMRWSA permit was pumped during this time period assuming that there would be storage available when river water was available.

The assessment conducted for the AEIS can be used only to provide a relative estimate of the extent to which surface water flows might be reduced during low flow days at the PRMRWSA intake. This is a reasonable limitation considering the following factors:

- The high variability in flows and weather (Section 6.2)
- The fact that existing active mining area is not increasing (Figure 107)
- The uncertainty associated with projections of future land uses (Section 3)

Depending on the period of record used in the analysis of recorded data, the average number of days when water could not be withdrawn at the PRMRWSA intake ranged from 35 to 77 days per year. This analysis indicates that the increase in the number of days when water could not be withdrawn is about 2 to 5 additional days per year (again depending on the period of record used in the analysis, Table 99). This represents about a 1.3 percent reduction in the volume available to be withdrawn (according to the permit limits) when the USGS flow record is reduced by 3.8 percent.

By using observed data, though, no additional allowance is required for existing impacts of surface water capture at the current mine operations in the flow record. The surface water delivery from the southern tributaries is expected to be higher than in the more northern reaches of the Peace River watershed, about 22 percent higher than an unweighted area-based average. Therefore, while it is possible that a greater relative effect could occur as the area being mined moves further south in the lower Peace River, the portion of the reduction that could be attributed to location would be small (specifically, a 22 percent of 5 days per year effect is about a 1 day per year increase attributed to the southerly location). Indeed, impacts from existing mines are already reflected in the flow record and are considered minor (Figure 108); however, it is possible that reductions could be masked by other low flow influences like agricultural irrigation return flow (PBS&J, 2007).

Despite the difficulty in discerning changes to low flows in the record, given the variability of potential low flow days and ignoring the potential for increased surface water from land use changes, this bounding analysis indicates that the maximum effect would be small (2 to 5 days, or less, or about 0.85 mgd). Considering that the SWFWMD predicts in their water supply plan that there is an additional 80 mgd of surface water still available to users in the Peace River (SWFWMD, 2010a), the maximum potential impact is small. The expected effect of land use changes on surface water delivery is predicted to increase by the time of maximum disturbance (2030 to 2040) by 1 to 4 percent over the existing 2009 annual dry season flow (Table 85). The future flow analysis included the capture of surface water, so the change in land uses would likely offset measureable changes in the number of low flow days from the Applicants' Preferred Alternatives.

7.0 Summary and Conclusions

Phosphate mining disrupts large areas at a time. The land is stripped and excavated to access the matrix with the ore. Historically, poor management and reclamation practices have led to increasing regulation and improvements to the mining activities. Current practices require isolating the mining areas, reducing groundwater use by utilizing stormwater that falls on the active sites, protecting surrounding wetlands from excessive dewatering, regulating water and wetland impacts by a variety of permits, and adopting improved reclamation practices that are also enforced by permit. The four Applicants' Preferred mines would be primarily south of and some are adjacent to existing mines. Through the AEIS process, two additional alternatives were identified as lands that may be mined within the 50-year time frame of the AEIS (Pine Level/Keys and Pioneer Tracts Alternatives). These two offsite alternatives most likely would be developed as extensions of Applicants' Preferred Alternatives and would begin operation further out in the future. However, the impacts predicted here would be similar if these offsite alternatives were moved forward in time, when compared to the No Action Alternative results. Finally, two additional offsite alternatives, Sites A-2 and W-2, were evaluated qualitatively because of their tentative schedule and lack of available information about their mining potential.

The impacts of phosphate mining are regulated at a local level by individual permits. The AEIS examines both the individual mines and their cumulative effect, including their additive impact because they would be operating at the same time. This evaluation examined many types of hydrologic effects on the surface water resources. A review of the land characteristics (soils, subwatershed, and topography), the applications, and the literature available that has assessed recent mining practices, indicated that a major effect of interest is the delivery of surface water downstream from phosphate mining land. Literature studies have examined these data in the past for current and past conditions, but none had done an analysis sufficient to account for the applications included in the AEIS for future conditions. Consequently, an analysis of the potential effects of the Applicants' Preferred and Pine Level/Keys and Pioneer Tracts Alternatives was necessary to determine the relative magnitude of impact to downstream surface waters flow. The assumptions used were conservative and provided a range of potential

effects that were considered very conservative, such that these computations were judged to provide a high bounding analysis of potential reductions to seasonal and annual flows in the two watersheds where the Applicants' Preferred and Pine Level/Keys and Pioneer Tracts Alternatives would be between now and 2060. Land use projections were not available from the local agencies far enough into the future, or with sufficient consistency, for use in this study. Therefore, land use predictions were developed for 2020, 2030, 2040, 2050, and 2060 based primarily on historical land use change data derived from the 1990, 1999, and 2009 GIS coverages obtained from SWFWMD. Trends in land use were extended into the future based on past land uses and, in general, include increases in urbanization and the conversion of pasture land into row crops. The area of wetlands and open water remained relatively unchanged. Existing mining land was converted into primarily agricultural and wetlands land uses, at a rate similar to the reclamation schedules of past mines on record with the FDEP.

The runoff coefficient approach was used to evaluate various phosphate mining scenarios associated with the alternatives. No other hydrologic prediction tools (models) were available that covered the entire area of interest. The land use projections were used in conjunction with annual average rainfall values and the land use-specific runoff coefficients obtained for this study area from Janicki (2010) to create No Action Alternative flow predictions with none of the Applicants' Preferred Alternatives in operation. The methodology was calibrated to measured gage flow for specific USGS gage locations relevant to the locations of the alternatives. Because the coefficients were calibrated to USGS data that included lands being mined, past and present impacts are implicitly included in the results. The runoff coefficient approach predicted annual surface water delivery reasonably well and included seasonal values (wet and dry season coefficients). Considering that the land use had to be predicted far into the future, this runoff coefficient approach was judged as a scientifically reasonable method to evaluate relative potential effects of mines under various stages of operation and reclamation.

Capture area schedules were developed from mine plan information extracted from the Clean Water Act Section 404 permit applications for the four mines (Mosaic, 2011a; Mosaic, 2011b; Mosaic, 2011c; CF Industries, 2010a) and from conceptual mine plans independently developed for the Pine Level/Keys and Pioneer Tracts. The capture area analyses quantified the active mine areas that would retain and manage stormwater runoff during the periods of mining. To be conservative during dry conditions, it was assumed that no unregulated offsite discharge would occur from within the capture area. For the 100 percent capture case, these capture areas were essentially deleted from the applicable subwatersheds during the applicable mine operation periods. However, mines do discharge stormwater through their NPDES-permitted outfalls (as well as in unmined portions of the land and through seepage from the ditch and berm systems). The Applicants' water use permit applications contain water balances that indicated about 35 percent of the runoff would be kept onsite for internal use during operations. Therefore, a second conservative estimate of 50 percent capture was made to predict how much rainfall may be discharged as stormwater under less conservative conditions (i.e., not drought). The two cases (100 and 50 percent capture) supported the subsequent calculation of the potential effects of these mining activities on reductions to downstream flows for those subwatersheds. Combined, these two cases are conservative because wet years are not estimated.

Individually, for most of the subwatersheds the estimated changes in flows from each mine are small, although some of the relative percentages were low to moderate even though the magnitude of differences was a 1 to 3 cfs. The effects are most prominent in the Horse Creek subwatershed when all actions' predicted impacts are summed. It is estimated that the maximum impact to Horse Creek would occur in 2035, when the greatest amount of capture area is projected to be under the influence of the various mining projects. The AEIS analyses predicted that a worst case scenario would involve decreases from 2009 flows at the Horse Creek gage station in 2035 of 17 percent for the annual average flow, 18 percent for the dry season flow, and 15 percent for the wet season flow, all during average rainfall conditions when assuming 100 percent capture of stormwater for all actions. Assuming a 50 percent capture of stormwater yields estimates of a 7 percent decrease in average annual flows, an 8 percent decrease in dry season flow, and a 6 percent decrease in wet season flow in 2035.

The Big Slough Basin may experience a reduction in flows of approximately 7 percent compared to 2009 flows resulting from the influence of the Pine Level/Keys Tract Alternative in this Myakka River subwatershed. Flow changes estimated with mining at the individual alternatives in all other subwatersheds evaluated and in the

Peace River and Myakka River watersheds are expected to be negligible. In fact, when compared to 2009 flows, because of the changes in projected land use in these watersheds, annual and seasonal average flows are expected to increase slightly from the increase in urbanization and crop lands. For all of the subwatersheds and watersheds that may be influenced by these four Applicants' Preferred mines, flows to the affected subwatersheds would return to nearly No Action Alternative conditions by 2060, assuming that the projected schedules for the mined lands to be reclaimed and released are finished in that time period.

Deliveries of water to the upper Charlotte Harbor Estuary from the Peace River and from the Myakka River were estimated for the same projection years. During the years of maximum capture area influence, the results of the analysis indicated that water deliveries to the upper Charlotte Harbor Estuary from these two rivers would be increased when compared to 2009 flows because of increased urbanization and other land use changes, even when including the summed impacts of the alternatives. When compared to the No Action Alternative results, projected flows would be slightly reduced, although estimated flows would still be above those predicted for 2009.

An additional bounding analysis of the number of low flow days and available water was conducted for the Peace River at PRMRWSA's intake location. Because the existing mines would be reclaimed and released, and the total area that would be mined under the applications would not substantially change the amount of area mined, effects of mining should already be reflected in the flow monitoring record. However, as the new mines move south, some of the potential stormwater in these areas could more effectively reach the Peace River outlet. It is conservatively estimated that the new mines could reduce the number of days that water could be withdrawn at the PRMRWSA intake by 2 to 5 per year. The reduction in volume of water withdrawn would also be small (maximum 1.3 percent). The actual reductions in any year vary significantly because of the wide range of flows and the utilities already have storage and interconnections in place to help deal with this variability. Flow is expected to increase at the intake location as a result of land use changes in the watershed by more than the mine capture area reductions would be in the future. The Pine Level/Keys Tract could not be assessed at the City of North Port's intake because of a lack of flow data for a period long enough for a reasonable analysis.

The potential effects of these mines were considered small to negligible depending on the subwatershed. The other two offsite alternatives, Sites A-2 and W-2, were evaluated qualitatively by comparing their size and location in relation to those alternatives with mine plans. Their impact is expected to be bounded by those quantified in the TM, and are thus also considered minor. Horse Creek would be the most affected by the new mines. However, given the wide range of flows recorded during and between years, it would be difficult to measure this effect (less than 10 percent change in annual values). The effect of the Applicants' Preferred Alternatives and offsite alternatives on the utilities withdrawing surface water from the downstream end of the two watersheds would also be difficult to discern because of the existing variable flow rates and range of low flow days without available water.

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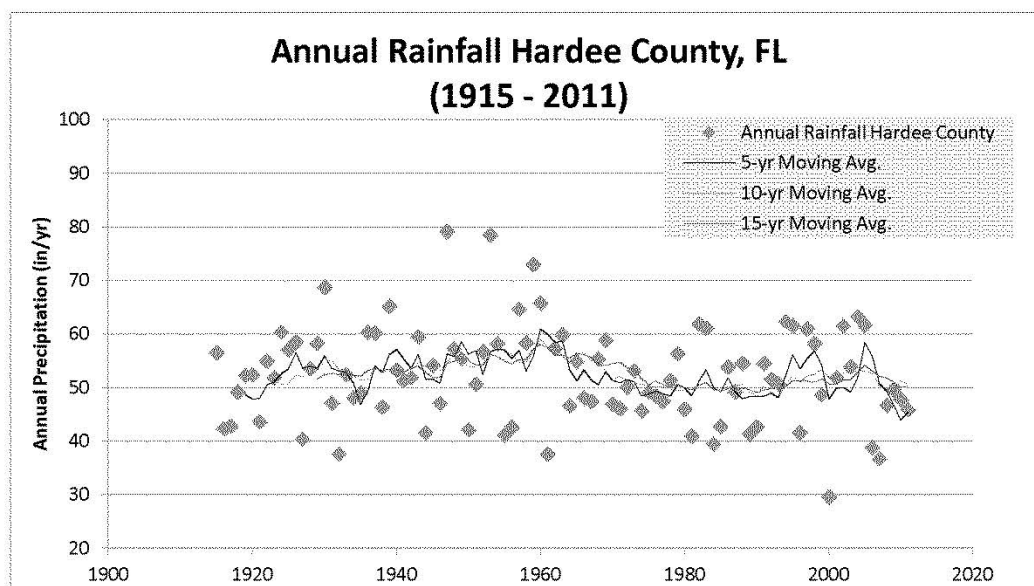
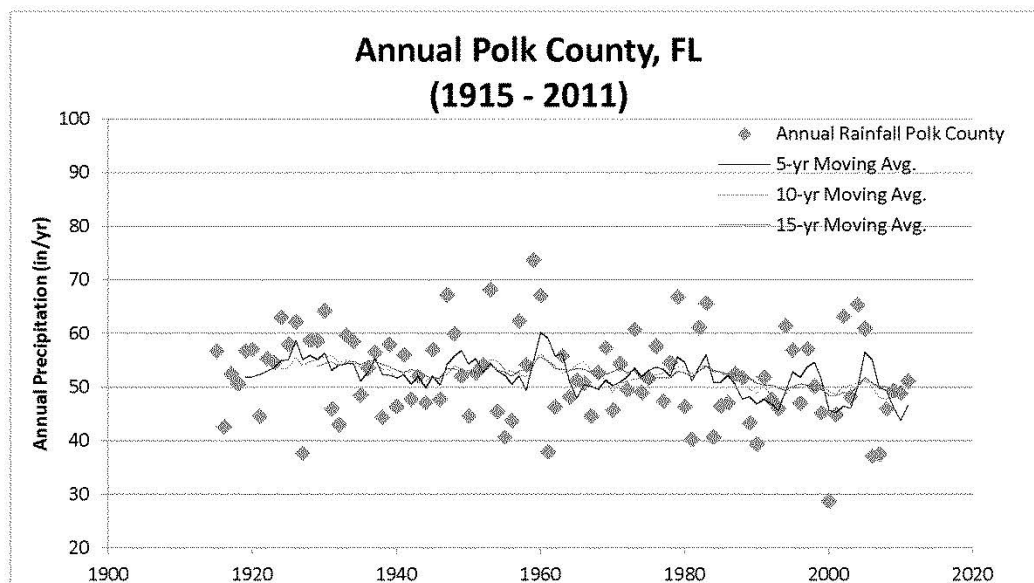
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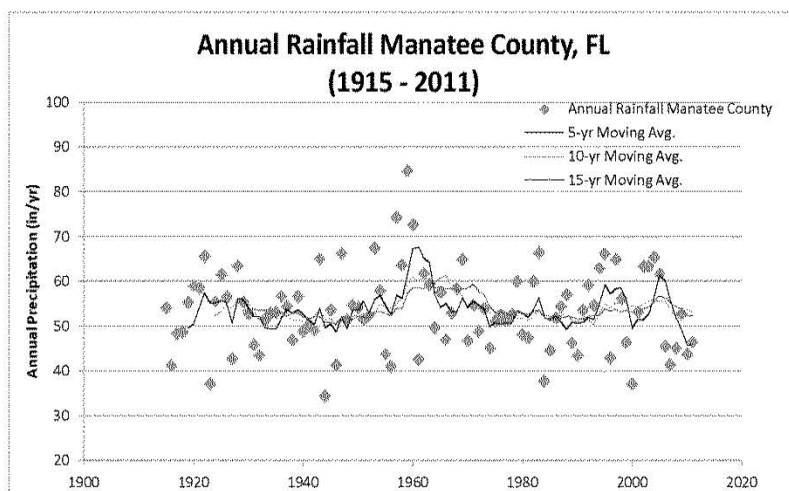
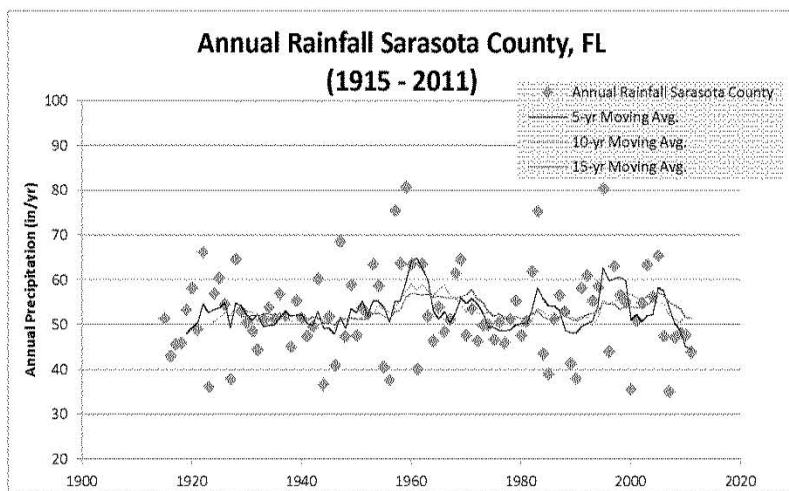
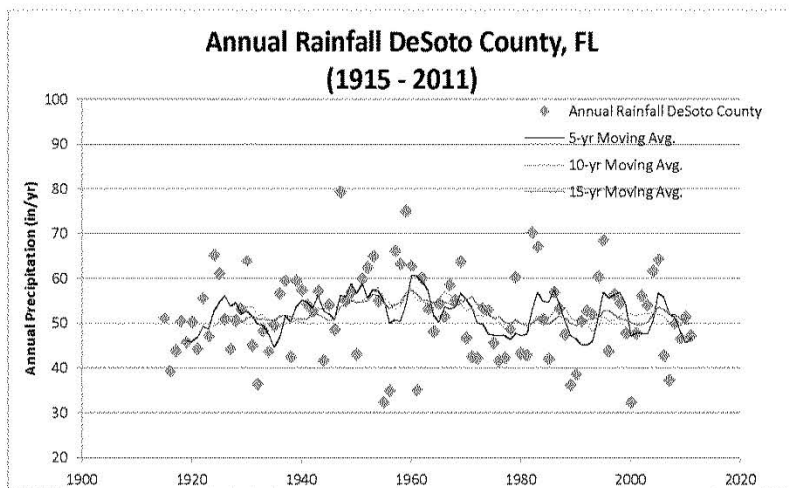
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Attachment A
SWFWMD Rainfall Data for Region

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Source: http://www.swfwmd.state.fl.us/data/wmdbweb/rainfall_data_summaries.php



Source: http://www.swfwmd.state.fl.us/data/wmdbweb/rainfall_data_summaries.php

Summary Statistics of Rainfall Records in Selected Counties in Southwest Florida (1915 through 2011)

Polk County

Month	January	February	March	April	May	June	July	August	September	October	November	December	Annual
MIN	0.04	0.14	0.30	0.00	0.41	1.53	3.10	3.94	1.11	0.11	0.02	0.10	28.81
MEAN	2.37	2.70	3.37	2.63	4.15	7.85	7.96	7.51	6.69	2.93	1.77	2.11	52.03
MAX	7.04	8.93	10.40	8.33	14.26	15.84	14.59	14.46	15.97	8.48	7.11	12.02	73.76
P20	0.85	1.00	1.31	1.14	1.91	5.87	6.21	5.67	4.33	1.20	0.49	0.64	45.57

Hardee County

Month	January	February	March	April	May	June	July	August	September	October	November	December	Annual
MIN	0.05	0.03	0.23	0.05	0.30	2.41	3.42	3.29	1.32	0.14	0.03	0.09	29.63
MEAN	2.16	2.57	2.97	2.64	3.92	8.34	8.18	7.56	7.25	3.10	1.69	1.85	52.22
MAX	7.49	8.97	10.00	8.49	12.28	16.63	14.82	15.73	15.72	9.77	9.45	8.00	79.21
P20	0.68	1.03	0.95	1.07	1.84	5.63	6.16	5.53	4.69	1.41	0.44	0.66	45.77

DeSoto County

Month	January	February	March	April	May	June	July	August	September	October	November	December	Annual
MIN	0.00	0.01	0.09	0.03	0.12	2.72	2.10	2.87	1.92	0.02	0.01	0.06	32.32
MEAN	2.00	2.41	2.89	2.45	3.79	8.38	7.98	7.66	7.39	3.34	1.73	1.79	51.81
MAX	7.66	10.84	8.49	7.90	11.40	19.58	16.00	15.97	16.85	13.05	5.56	7.29	79.38
P20	0.50	0.85	0.92	0.90	1.85	5.35	5.56	5.51	4.99	1.27	0.49	0.60	43.44

Sarasota County

Month	January	February	March	April	May	June	July	August	September	October	November	December	Annual
MIN	0.00	0.01	0.13	0.00	0.20	2.22	2.45	2.37	3.28	0.00	0.00	0.00	35.11
MEAN	2.29	2.60	3.00	2.42	3.04	7.57	8.27	8.59	7.73	3.28	1.86	1.99	52.64
MAX	8.09	9.29	10.14	10.52	10.11	22.45	16.05	19.08	18.63	10.90	6.71	9.29	80.78
P20	0.68	0.92	0.81	0.65	1.23	4.20	6.15	5.96	5.19	1.28	0.49	0.70	46.00

Manatee County

Month	January	February	March	April	May	June	July	August	September	October	November	December	Annual
MIN	0.01	0.02	0.11	0.00	0.11	2.11	3.43	2.93	1.98	0.03	0.00	0.04	34.39
MEAN	2.42	2.77	3.11	2.43	3.15	7.62	8.63	8.86	7.52	3.11	1.86	2.06	53.55
MAX	7.71	9.17	10.36	9.05	10.19	19.96	17.65	18.31	16.38	11.33	7.70	10.35	84.75
P20	0.76	1.00	0.88	0.84	1.22	4.83	6.45	6.34	4.55	1.42	0.55	0.74	45.93

Source: http://www.swfwmd.state.fl.us/data/wmdbweb/rainfall_data_summaries.php

MIN, MEAN, and MAX are the minimum, mean, and maximum values per Month or Annual totals, respectively.

P20 is the lowest 20th Percentile Value per Month or Annual totals.

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Attachment B
Capture Area Analysis

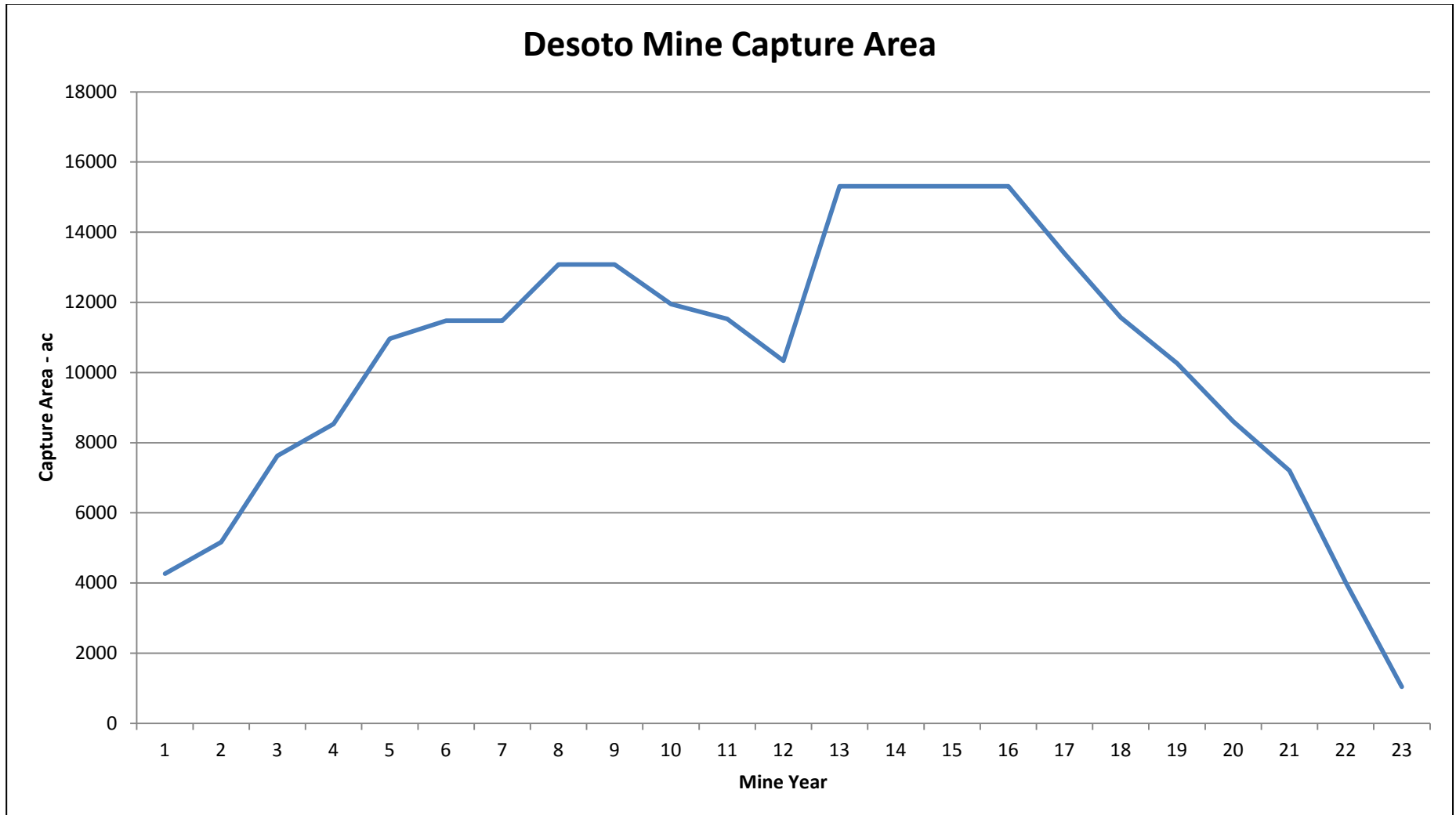
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Desoto Mine Capture Area Analysis

Plant																		CSA					
CSA and others				D-1a & D-1b	D-2		Plant Site +			D-3a	D-3b	D-3c	D-4					4292					
Area	ac	900	1400	1307	966	550	640	800	400	482	511	505	521	1600	800	2000	420	220	400	1660	1920	280	18,282
Reclamation	Area	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	Capture Area
Ditching	Year	13	13	1	1	1	1	1	13	2	4	5	6	8	3	13	2	10	4	3	5	13	
Release	Year	21	20	18	22	9	23	9	23	22	22	22	22	17	11	21	10	17	11	19	16	21	
	Mine																						
	Year																						
2021	1			1307	966	550	640	800															4263
	2			1307	966	550	640	800		482							420						5165
	3			1307	966	550	640	800		482					800		420			1660			7625
	4			1307	966	550	640	800		482	511				800		420		400	1660			8536
2025	5			1307	966	550	640	800		482	511	505			800		420		400	1660	1920		10961
	6			1307	966	550	640	800		482	511	505	521		800		420		400	1660	1920		11482
	7			1307	966	550	640	800		482	511	505	521		800		420		400	1660	1920		11482
	8			1307	966	550	640	800		482	511	505	521	1600	800		420		400	1660	1920		13082
	9			1307	966	550	640	800		482	511	505	521	1600	800		420		400	1660	1920		13082
2030	10			1307	966		640			482	511	505	521	1600	800		420	220	400	1660	1920		11952
	11			1307	966		640			482	511	505	521	1600	800			220	400	1660	1920		11532
	12			1307	966		640			482	511	505	521	1600				220		1660	1920		10332
	13	900	1400	1307	966		640		400	482	511	505	521	1600		2000		220		1660	1920	280	15312
	14	900	1400	1307	966		640		400	482	511	505	521	1600		2000		220		1660	1920	280	15312
2035	15	900	1400	1307	966		640		400	482	511	505	521	1600		2000		220		1660	1920	280	15312
	16	900	1400	1307	966		640		400	482	511	505	521	1600		2000		220		1660	1920	280	15312
	17	900	1400	1307	966		640		400	482	511	505	521	1600		2000		220		1660		280	13392
	18	900	1400	1307	966		640		400	482	511	505	521			2000				1660		280	11572
	19	900	1400		966		640		400	482	511	505	521			2000				1660		280	10265
2040	20	900	1400		966		640		400	482	511	505	521			2000						280	8605
	21	900			966		640		400	482	511	505	521			2000						280	7205
	22				966		640		400	482	511	505	521										4025
	23						640		400														1040
	24																						
2045	25																						

Desoto Mine Capture Area Analysis

Plant																		CSA					
CSA and others				D-1a & D-1b	D-2		Plant Site +			D-3a	D-3b	D-3c	D-4					4292					
Area	ac	900	1400	1307	966	550	640	800	400	482	511	505	521	1600	800	2000	420	220	400	1660	1920	280	18,282
Reclamation	Area	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	Capture Area
Ditching	Year	13	13	1	1	1	1	1	13	2	4	5	6	8	3	13	2	10	4	3	5	13	
Release	Year	21	20	18	22	9	23	9	23	22	22	22	22	17	11	21	10	17	11	19	16	21	
	Mine																						
	Year																						
	26																						
	27																						
	28																						
	29																						
2050	30																						
	31																						
	32																						
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2060	40																						
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2065	45																						



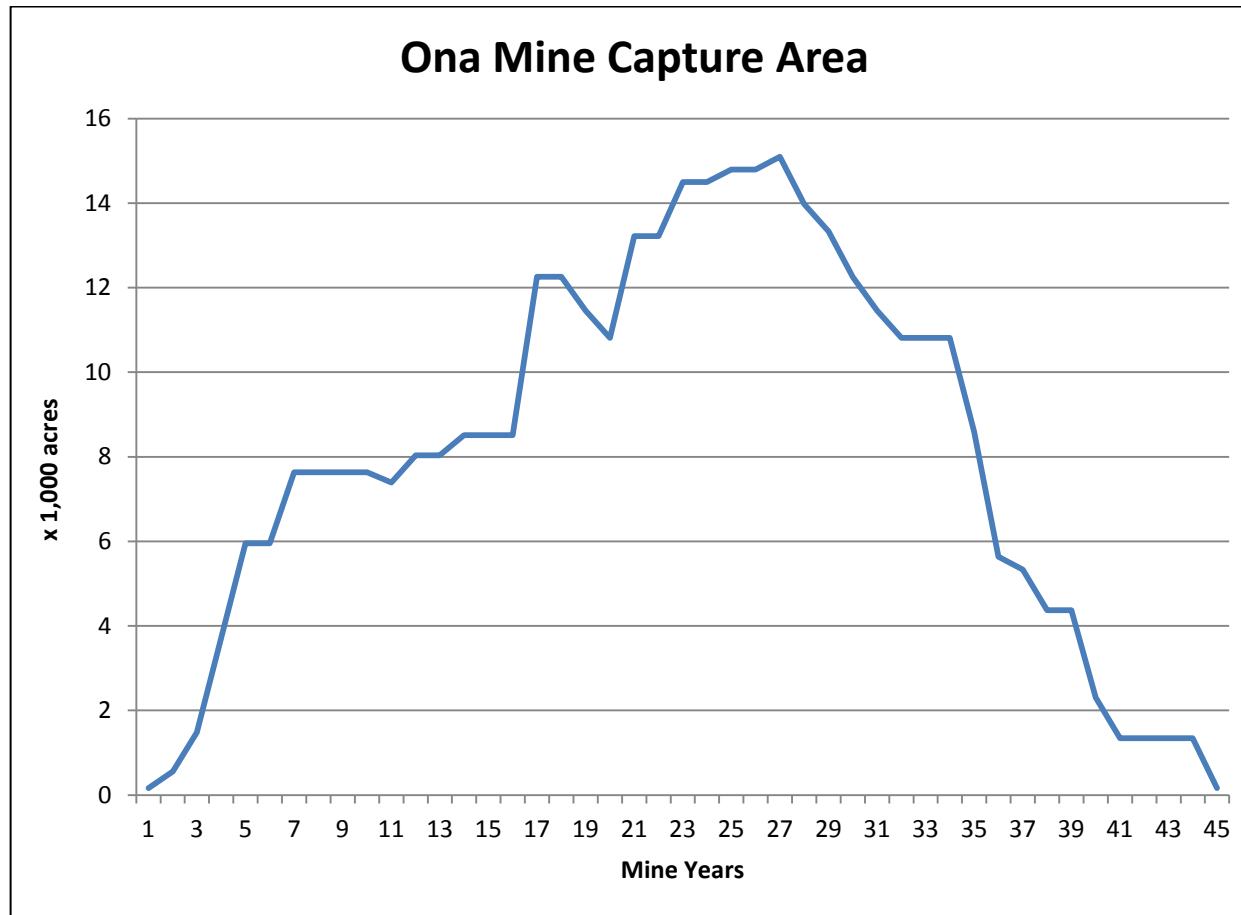
Ona Mine Capture Area Analysis

CSA		O-1C					O-2		O-3A	O-3B						Plant	O-4A	O-4B	O-4C											CSA Area	6016	
Area (acres)		602	960	960	160	320	879	480	958	1185	960	640	800	240	300	160	160	2072	160	300	1280	1600	800	1920	640	640	19176					
Reclamation Area	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	Capture Area	Capture Area Myakka	Captu re Area Horse	Capture Area Arcadia		
Ditching Year		3	23	23	28	3	7	21	14	17	23	5	12	2	27	0	4	4	2	26	17	5	7	21	17	17						
Release Year		29	37	34	35	13	35	29	40	44	34	19	30	10	36	45	11	39	13	34	27	22	18	35	31	28						

1																160														160	0	160	0
2														240		160			160											560	0	560	0
3		602				320								240		160			160											1482	0	1482	0
4		602				320								240		160	160	2072	160											3714	0	3714	0
5		602				320						640		240		160	160	2072	160				1600							5954	0	5954	0
6		602				320						640		240		160	160	2072	160				1600							5954	0	5954	0
7		602				320	879					640		240		160	160	2072	160				1600	800						7633	0	7633	0
8		602				320	879					640		240		160	160	2072	160				1600	800						7633	0	7633	0
9		602				320	879					640		240		160	160	2072	160				1600	800						7633	0	7633	0
10		602				320	879					640		240		160	160	2072	160				1600	800						7633	0	7633	0
11		602				320	879					640				160	160	2072	160				1600	800						7393	0	7393	0
12		602				320	879					640	800			160		2072	160				1600	800						8033	0	8033	0
13		602				320	879					640	800			160		2072	160				1600	800						8033	0	8033	0
14		602					879		958			640	800			160		2072					1600	800						8511	0	8511	0
15		602					879		958			640	800			160		2072					1600	800						8511	0	8511	0
16		602					879		958			640	800			160		2072					1600	800						8511	0	8511	0
17		602					879		958	1185		640	800			160		2072				1280	1600	800		640	640	12256	0	10976	1280		
18		602					879		958	1185		640	800			160		2072				1280	1600	800		640	640	12256	0	10976	1280		
19		602					879		958	1185		640	800			160		2072				1280	1600			640	640	11456	0	10176	1280		
20		602					879		958	1185			800			160		2072				1280	1600			640	640	10816	0	9536	1280		
21		602					879	480	958	1185			800			160		2072				1280	1600		1920	640	640	13216	0	11936	1280		
22		602					879	480	958	1185			800			160		2072				1280	1600		1920	640	640	13216	0	11936	1280		
23		602	960	960			879	480	958	1185	960		800			160		2072				1280			1920	640	640	14496	960	12256	1280		
24		602	960	960			879	480	958	1185	960		800			160		2072				1280			1920	640	640	14496	960	12256	1280		
25		602	960	960			879	480	958	1185	960		800			160		2072		300	1280			1920	640	640	14796	960	12556	1280			
26		602	960	960			879	480	958	1185	960		800			160		2072		300	1280			1920	640	640	14796	960	12556	1280			
27		602	960	960			879	480	958	1185	960		800		300	160		2072		300	1280			1920	640	640	15096	960	12856	1280			
28		602	960	960	160		879	480	958	1185	960		800		300	160		2072		300				1920	640	640	13976	960	11736	1280			
29		602	960	960	160		879	480	958	1185	960		800		300	160		2072		300				1920	640		13336	960	11736	640			
30			960	960	160		879		958	1185	960		800		300	160		2072		300				1920	640		12254	960	10654	640			

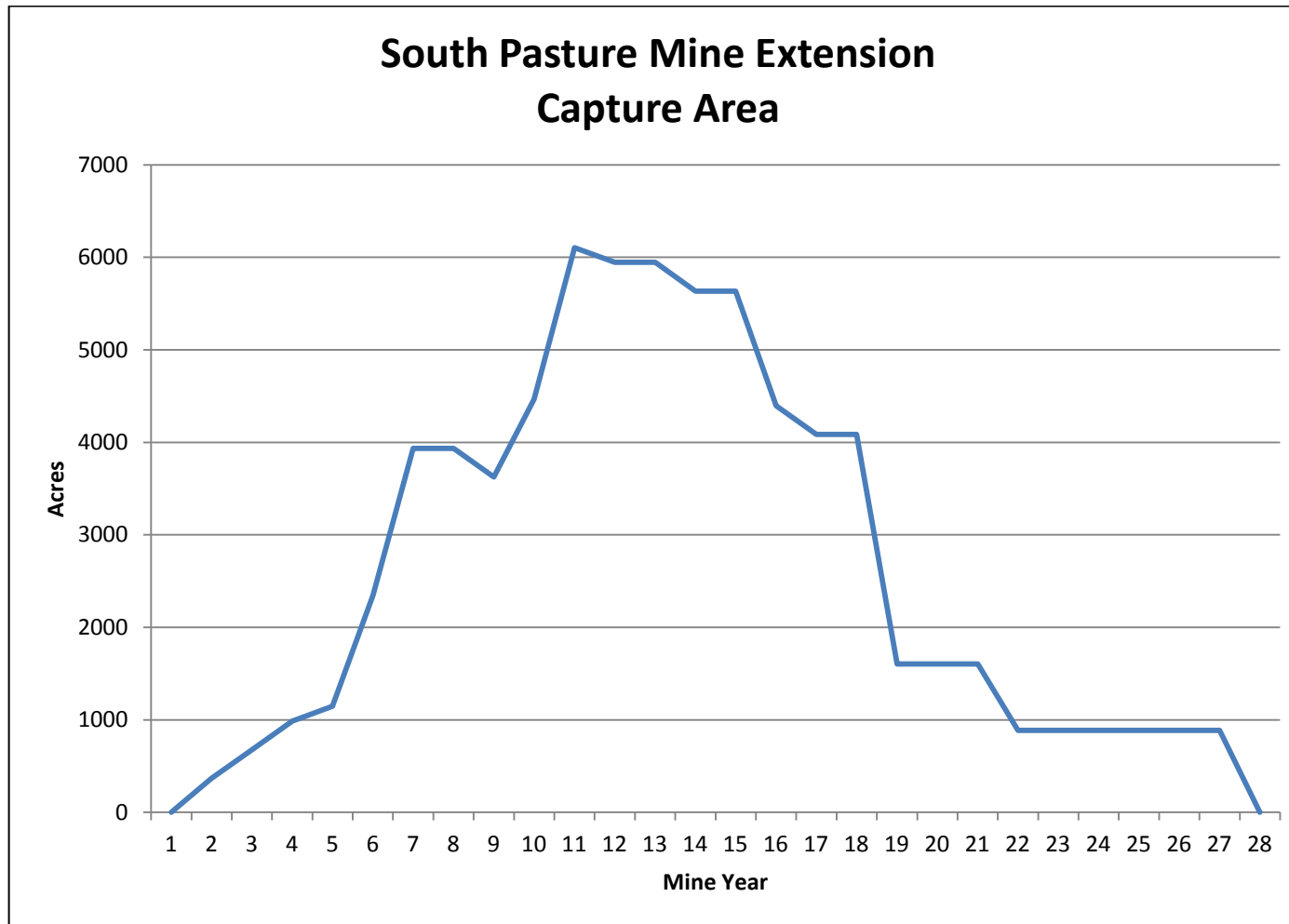
Ona Mine Capture Area Analysis

CSA		O-1C					O-2		O-3A	O-3B						Plant	O-4A	O-4B	O-4C										CSA Area	6016	
Area (acres)	1	602	960	960	160	320	879	480	958	1185	960	640	800	240	300	160	160	2072	160	300	1280	1600	800	1920	640	640	19176				
Reclamation Area		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	Cap- ture Area	Capture Area Myakka	Captu re Area Horse	Capture Area Arcadia	
Ditching Year		3	23	23	28	3	7	21	14	17	23	5	12	2	27	0	4	4	2	26	17	5	7	21	17	17					
Release Year		29	37	34	35	13	35	29	40	44	34	19	30	10	36	45	11	39	13	34	27	22	18	35	31	28					
31			960	960	160		879		958	1185	960				300	160		2072		300				1920	640		11454	960	9854	640	
32			960	960	160		879		958	1185	960				300	160		2072		300				1920			10814	960	9854	0	
33			960	960	160		879		958	1185	960				300	160		2072		300				1920			10814	960	9854	0	
34			960	960	160		879		958	1185	960				300	160		2072		300				1920			10814	960	9854	0	
35			960		160		879		958	1185					300	160		2072						1920			8594	0	8594	0	
36			960						958	1185					300	160		2072									5635	0	5635	0	
37			960						958	1185						160		2072									5335	0	5335	0	
38									958	1185						160		2072									4375	0	4375	0	
39									958	1185						160		2072									4375	0	4375	0	
40									958	1185						160											2303	0	2303	0	
41										1185						160											1345	0	1345	0	
42										1185						160											1345	0	1345	0	
43										1185						160											1345	0	1345	0	
44										1185						160											1345	0	1345	0	
45																160											160	0	160	0	



South Pasture Mine Extension Capture Area Analysis

CSA		SPX 3				SPX 4				SPX 1 & 2		Capture Area
Block Area	ac	368	310	310	310	352	840	1640	1240	886	160	6416
Reclamation	Area	a	b	c	d	e	f	g	h	i	j	CSA Area
Ditching	Year	1	2	3	5	6	9	10	6	5	4	1606
Release	Year	20	12	7	15	20	17	17	14	26	10	
	Mining Years											
2018	0											0
2019	1	368										368
2020	2	368	310									678
2021	3	368	310	310								988
2022	4	368	310	310							160	1148
2023	5	368	310	310	310					886	160	2344
2024	6	368	310	310	310	352			1240	886	160	3936
2025	7	368	310	310	310	352			1240	886	160	3936
2026	8	368	310		310	352			1240	886	160	3626
2027	9	368	310		310	352	840		1240	886	160	4466
2028	10	368	310		310	352	840	1640	1240	886	160	6106
2029	11	368	310		310	352	840	1640	1240	886		5946
2030	12	368	310		310	352	840	1640	1240	886		5946
2031	13	368			310	352	840	1640	1240	886		5636
2032	14	368			310	352	840	1640	1240	886		5636
2033	15	368			310	352	840	1640		886		4396
2034	16	368				352	840	1640		886		4086
2035	17	368				352	840	1640		886		4086
2036	18	368				352				886		1606
2037	19	368				352				886		1606
2038	20	368				352				886		1606
2039	21									886		886
2040	22									886		886
2041	23									886		886
2042	24									886		886
2043	25									886		886
2044	26									886		886
2045	27											0



Wingate Mine East Capture Area Analysis

		WE-1	WE-2					Unmined				972									Capture Area
Area	ac	320	652	380	300	340	500	276	50	40	45	50	50	50	50	50	50	50	50	50	3353
Reclamation	Area	a-1	a-2	b	c	d	e	f	g-30	g-34	g-35	g-36	g-37	g-38	g-39	g-40	g-41	g-42	g-43	g-44	CSA
Ditching	Year	18	23	19	27	33	44		29	33	34	35	36	37	38	39	40	41	42	43	972
Release	Year	55	55	32	38	46	56	56	38	39	40	41	42	43	44	45	46	47	48	49	

Mine

Year

2019	18	320																			320
2020	19	320		400																	720
2021	20	320		400																	720
2022	21	320		400																	720
2023	22	320		400																	720
2024	23	320	652	400																	1372
2025	24	320	652	400																	1372
2026	25	320	652	400																	1372
2027	26	320	652	400				276													1648
2028	27	320	652	400	320			276													1968
2029	28	320	652	400	320			276													1968
2030	29	320	652	400	320			276	50												2018
2031	30	320	652	400	320			276	50												2018
2032	31	320	652	400	320			276	50												2018
2033	32	320	652	400	320	380		276	50												2398
2034	33	320	652		320	380		276	50	40											2038
2035	34	320	652		320	380		276	50	40	45										2083
2036	35	320	652		320	380		276	50	40	45	50	50								2183
2037	36	320	652		320	380		276	50	40	45	50	50								2183
2038	37	320	652		320	380		276	50	40	45	50	50	50							2233
2039	38	320	652		320	380		276	50	40	45	50	50	50	50						2283
2040	39	320	652			380		276		40	45	50	50	50	50	50					1963
2041	40	320	652			380		276			45	50	50	50	50	50	50				1973
2042	41	320	652			380		276				50	50	50	50	50	50	50			1978
2043	42	320	652			380		276					50	50	50	50	50	50	50	50	2028
2044	43	320	652			380		276						50	50	50	50	50	50	50	1978
2045	44	320	652			380	520	276							50	50	50	50	50	50	2448
2046	45	320	652			380	520	276								50	50	50	50	50	2398

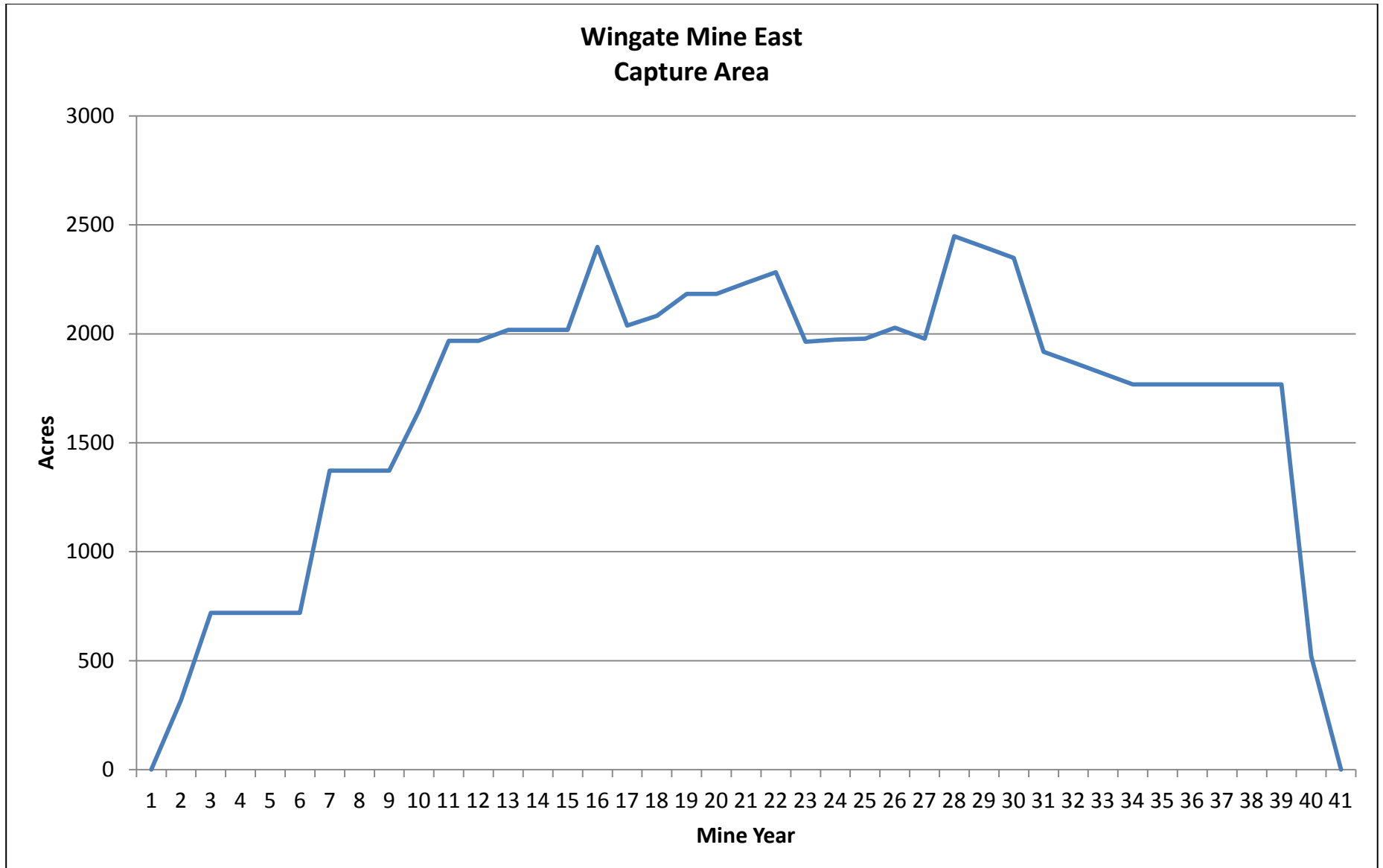
Wingate Mine East Capture Area Analysis

		WE-1	WE-2					Unmined				972									Capture Area
Area	ac	320	652	380	300	340	500	276	50	40	45	50	50	50	50	50	50	50	50	50	3353
Reclamation	Area	a-1	a-2	b	c	d	e	f	g-30	g-34	g-35	g-36	g-37	g-38	g-39	g-40	g-41	g-42	g-43	g-44	CSA
Ditching	Year	18	23	19	27	33	44		29	33	34	35	36	37	38	39	40	41	42	43	972
Release	Year	55	55	32	38	46	56	56	38	39	40	41	42	43	44	45	46	47	48	49	

Mine

Year

2047	46	320	652			380	520	276									50	50	50	50	2348
2048	47	320	652				520	276										50	50	50	1918
2049	48	320	652				520	276											50	50	1868
2050	49	320	652				520	276												50	1818
2051	50	320	652				520	276													1768
2052	51	320	652				520	276													1768
2053	52	320	652				520	276													1768
2054	53	320	652				520	276													1768
2055	54	320	652				520	276													1768
2056	55	320	652				520	276													1768
2057	56						520														520



Plant																																
CSA																																
Area (acres)			582	539	480	698	221	743	375	364	419	516	608	569	658	950	656	352	624	536	257	801	294	327	848	446	358	353				
Reclamation Area			a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	ss	t	u	v	w	x	xx				
Ditching Year			1	1	1	2	4	6	9	10	8	11	7	14	11	12	17	15	17	16	14	19	21	21	19	23	19	19				
Sand Tailings Year			6	8	6	8	11	12	12	12	13	16	13	19	17	18	23	19	21	21	22	23	25	25	25	28	27	23				
Release Year			0	0	0	0	0	0	0	0	16	19	16	22	20	21	26	22	24	24	25	26	28	28	28	31	30	26				
	Year as Extension	Mine Year*																														
	2034	1	582	539	480																											
		2	582	539	480	698																										
		3	582	539	480	698																										
		4	582	539	480	698	221																									
		5	582	539	480	698	221																									
		6	582	539	480	698	221	743																								
	2040	7	582	539	480	698	221	743					608																			
		8	582	539	480	698	221	743			419		608																			
		9	582	539	480	698	221	743	375		419		608																			
		10		539		698	221	743	375	364	419		608																			
		11		539		698	221	743	375	364	419	516	608			950																
	2045	12					221	743	375	364	419	516	608			950																
		13					221	743	375	364	419	516	608			950																
		14					221	743	375	364	419	516	608	569	658	950					257											
		15						743	375	364	419	516	608	569	658	950		352			257											
		16									419	516	608	569	658	950		352		536	257											
	2050	17										516		569	658	950	656	352	624	536	257											
		18										516		569	658	950	656	352	624	536	257											
		19										516		569	658	950	656	352	624	536	257	801			848		358					
		20												569	658	950	656	352	624	536	257	801			848		358	353				
		21												569	658		656	352	624	536	257	801	294	327	848		358	353				
	2055	22												569	658		656	352	624	536	257	801	294	327	848		358	353				
		23													658		656		624	536	257	801	294	327	848	446	358	353				
		24															656		624	536	257	801	294	327	848	446	358	353				
		25															656				257	801	294	327	848	446	358	353				
		26															656					801	294	327	848	446	358	353				
	2060	27																					294	327	848	446	358					

* Mining stops in mine year 32.

Pine Level/Keys Capture Area Analysis (Reclamation Area Y - DD)

Plant								Recla- mation	CSA				Recla- mation Parcels	CSA	Total Recla- mation	Preser- vation	Total Mine Acres
CSA								17,491	2817								
Area (acres)			657	762	212	927	706	653	687	694	607	829	17,490	2,817	20,308	3,797	24,105
Reclamation Area			y	z	aa	bb	cc	dd	SE	SW	NE	NW	73%	12%	84%	16%	
Ditching Year			21	22	25	26	26	24	1	4	2	6					
Sand Tailings Year			26	28	28	32	32	30	31	31	36	37					
Release Year			29	31	31	35	35	33	33	33	39	40					
	Year as Extension	Mine Year*															
	2034	1							687						2288		
		2							687		607				3592		
		3							687		607				3592		
		4							687	694	607				4508		
		5							687	694	607				4508		
		6							687	694	607	829			6081		
	2040	7							687	694	607	829			6689		
		8							687	694	607	829			7108		
		9							687	694	607	829			7483		
		10							687	694	607	829			6785		
		11							687	694	607	829			8251		
	2045	12							687	694	607	829			7014		
		13							687	694	607	829			7014		
		14							687	694	607	829			8497		
		15							687	694	607	829			8628		
		16							687	694	607	829			7681		
	2050	17							687	694	607	829			7933		
		18							687	694	607	829			7933		
		19							687	694	607	829			9940		
		20							687	694	607	829			9777		
		21	657						687	694	607	829			10106		
	2055	22	657	762					687	694	607	829			10867		
		23	657	762					687	694	607	829			10392		
		24	657	762				653	687	694	607	829			10388		
		25	657	762	212			653	687	694	607	829			9441		
		26	657	762	212	927	706	653	687	694	607	829			10816		
	2060	27	657	762	212	927	706	653	687	694	607	829			9007		

Pine Level/Keys Capture Area Analysis (Reclamation Area Y - DD)

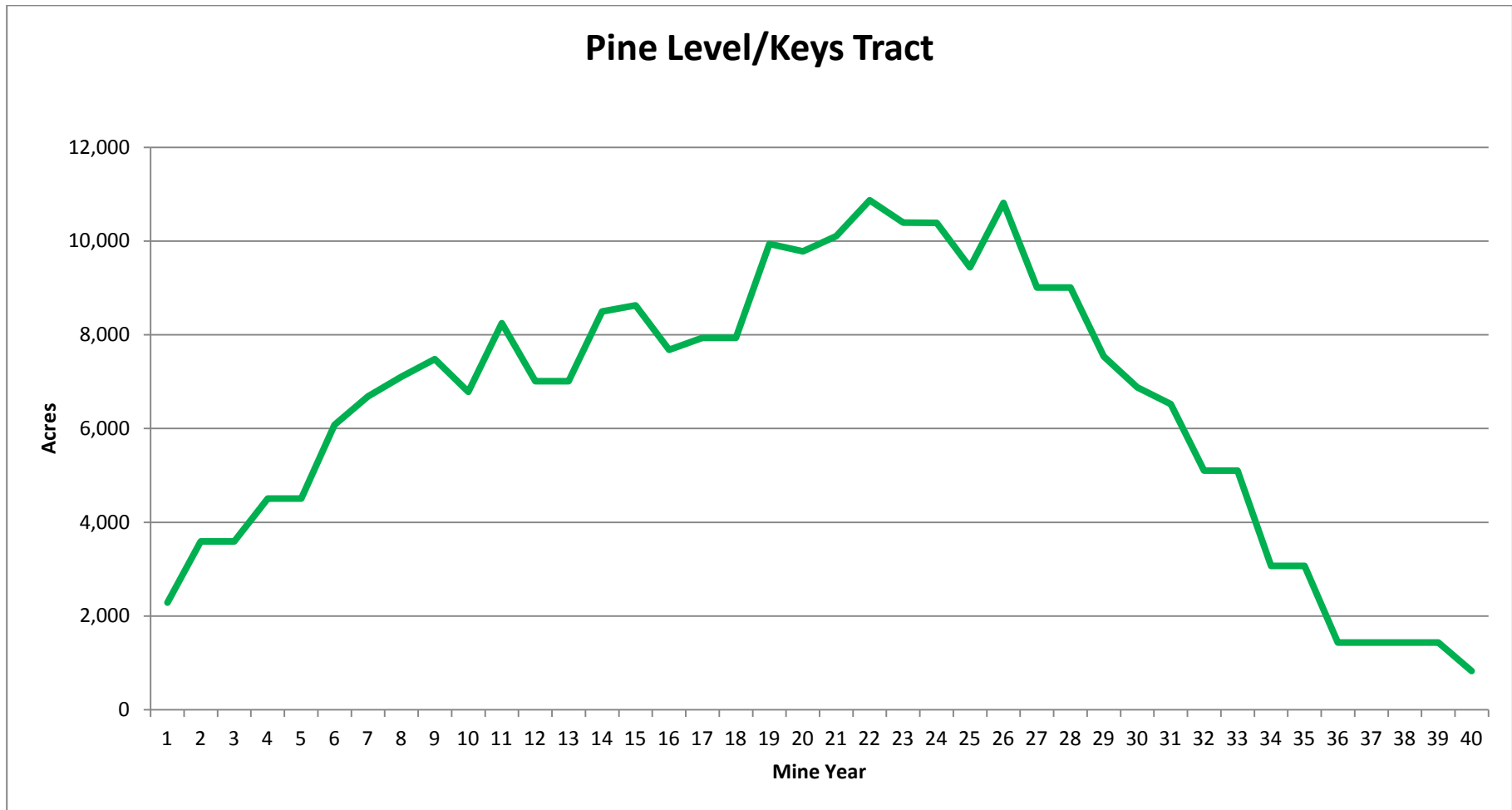
Plant								Recla- mation	CSA				Recla- mation Parcels	CSA	Total Recla- mation	Preser- vation	Total Mine Acres
CSA								17,491	2817								
Area (acres)			657	762	212	927	706	653	687	694	607	829	17,490	2,817	20,308	3,797	24,105
Reclamation Area			y	z	aa	bb	cc	dd	SE	SW	NE	NW	73%	12%	84%	16%	
Ditching Year			21	22	25	26	26	24	1	4	2	6					
Sand Tailings Year			26	28	28	32	32	30	31	31	36	37					
Release Year			29	31	31	35	35	33	33	33	39	40					
	Year as Extension	Mine Year*															
		28	657	762	212	927	706	653	687	694	607	829			9007		
		29	657	762	212	927	706	653	687	694	607	829			7538		
		30		762	212	927	706	653	687	694	607	829			6881		
		31		762	212	927	706	653	687	694	607	829			6523		
	2065	32				927	706	653	687	694	607	829			5103		
		33				927	706	653	687	694	607	829			5103		
		34				927	706				607	829			3069		
		35				927	706				607	829			3069		
		36									607	829			1436		
	2070	37									607	829			1436		
		38									607	829			1436		
		39									607	829			1436		
		40										829			829		
		41															
	2075	42															
		43															
		44															
	2078	45															

* Mining stops in mine year 32.

Assumptions:

1	Sand tailings completed 2 years after last year of mining in reclamation parcel
2	Land is cleared 1 year prior to mining
3	Reclamation is complete 3 years after sand tailings are complete
4	CSA 5 years after last filling reclamation starts

	Total Mine Acres	Years	Mine ac/yr
Draglines			
Green -1	5,493	28	196
Orange - 2	4,303	26	166
Red - 3	5,172	31	167
Yellow - 4	5,339	32	167
Average		29	174
Total Acres	20,308		



Pioneer Tract Capture Area Analysis (Sites 1-6 and A-U)

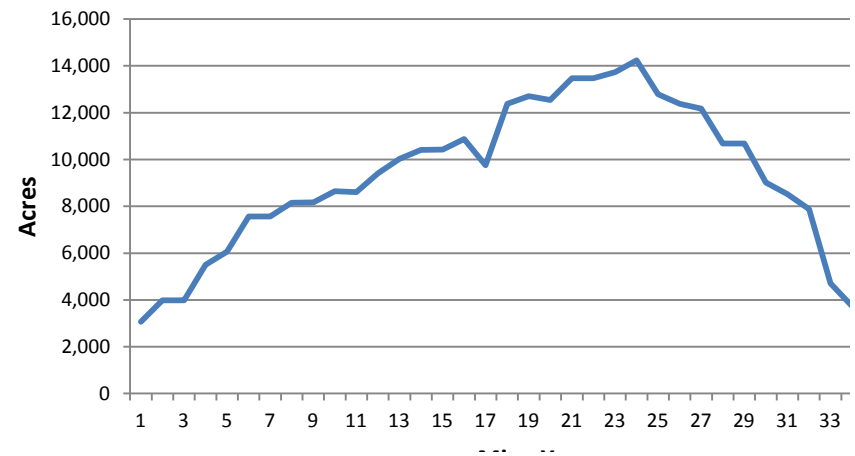
	Site ID	1	2	3	4	5	6	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
	Acres	1,161	1,255	825	952	977	915	478	338	528	379	268	531	562	477	429	587	478	878	574	455	309	379	575	1,046	597	484	358
	R	R	R	Y	Y	Y	Y	P	O	P	O	O	O	P	O	O	P	P	P	R	O	R	O	Y	R	P	Y	R
	D&B Year	1	4	9	1	6	12	1	1	2	2	4	6	5	10	12	8	11	13	15	16	20	14	18	18	18	21	21
Mine Year	Start	1	5	10	1	7	13	1	1	3	3	5	7	6	11	13	9	12	14	16	17	21	15	19	19	19	22	22
	End	30	24	30	24	24	30	2	2	5	4	6	10	8	12	14	10	13	18	18	18	21	16	21	20	21	24	23
start + 3 years Sand Tailings		35	29	35	29	29	35	5	5	8	7	9	13	11	15	17	13	16	21	21	21	24	19	24	23	24	27	26
3 yrs end Reclamation		38	32	38	32	32	38	8	8	11	10	12	16	14	18	20	16	19	24	24	24	27	22	27	26	27	30	29
As																												
Extension	Mine Year																											
2048	1	1161			952			478	338																			
	2	1161			952			478	338	528	379																	
2050	3	1161			952			478	338	528	379																	
	4	1161	1255		952			478	338	528	379	268																
	5	1161	1255		952			478	338	528	379	268		562														
	6	1161	1255		952	977		478	338	528	379	268	531	562														
	7	1161	1255		952	977		478	338	528	379	268	531	562														
	8	1161	1255		952	977		478	338	528	379	268	531	562			587											
	9	1161	1255	825	952	977				528	379	268	531	562			587											
	10	1161	1255	825	952	977				528	379	268	531	562	477		587											
	11	1161	1255	825	952	977				528		268	531	562	477		587	478										
2060	12	1161	1255	825	952	977	915					268	531	562	477	429	587	478										
	13	1161	1255	825	952	977	915						531	562	477	429	587	478	878									
	14	1161	1255	825	952	977	915						531	562	477	429	587	478	878			379						
	15	1161	1255	825	952	977	915						531		477	429	587	478	878	574		379						
	16	1161	1255	825	952	977	915						531		477	429	587	478	878	574	455	379						
	17	1161	1255	825	952	977	915								477	429		478	878	574	455	379						
	18	1161	1255	825	952	977	915								477	429		478	878	574	455	379	575	1046	597			
	19	1161	1255	825	952	977	915									429		478	878	574	455	379	575	1046	597			
	20	1161	1255	825	952	977	915									429			878	574	455	309	379	575	1046	597		
	21	1161	1255	825	952	977	915												878	574	455	309	379	575	1046	597	484	358
	22	1161	1255	825	952	977	915												878	574	455	309	379	575	1046	597	484	358
2070	23	1161	1255	825	952	977	915												878	574	455	309		575	1046	597	484	358
	24	1161	1255	825	952	977	915												878	574	455	309		575	1046	597	484	358
	25	1161	1255	825	952	977	915														309		575	1046	597	484	358	
	26	1161	1255	825	952	977	915														309		575	1046	597	484	358	
	27	1161	1255	825	952	977	915														309		575		597	484	358	
	28	1161	1255	825	952	977	915																			484	358	
	29	1161	1255	825	952	977	915																				484	358
	30	1161	1255	825	952	977	915																				484	
	31	1161	1255	825	952	977	915																					
2080	32	1161	1255	825	952	977	915																					
	33	1161		825			915																					
	34	1161		825			915																					
	35	1161		825			915																					
	36	1161		825			915																					
	37	1161		825			915																					
2085	38	1161		825			915																					

Pioneer Tract Capture Area Analysis (Sites V-DD and Totals)

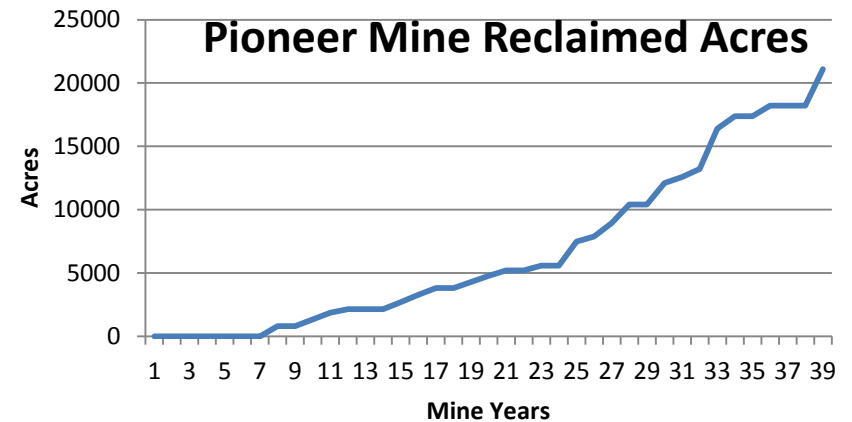
	Site ID	V	W	X	Y	Z	AA	BB	CC	DD	Total	CSA	
	Acres	408	804	584	518	510	456	252	639	142	21,109	6,085	15,024
		O	O	R	P	Y	R	Y	R	R		29%	
	D&B Year	18	19	27	21	24	25	27	23	1	30 reclamation parcels average		
Mine Year	Start	19	20	28	22	25	26	28	24	1		24,834	
	End	19	23	29	23	27	27	29	25	4		Total	
start + 3 years Sand Tailings		22	26	32	26	30	30	32	28	7		Mine	501
3 yrs end Reclamation		25	29	35	29	33	33	35	31	10		Acres	ac per parcel

As Extension	Mine Year												
2048	1									142		3071	
	2									142		3979	
	3									142		3979	
	4									142		5502	
	5									142		6064	
	6									142		7573	
	7									142		7573	
	8									142		8159	
	9									142		8167	
	10									142		8644	
	11											8602	
	12											9417	
2060	13											10027	
	14											10406	
	15											10418	
	16											10873	
	17											9755	
	18	408										12382	
	19	408	804									12709	
	20	408	804									12539	
	21	408	804		518							13470	
	22	408	804		518							13470	
	23	408	804		518				639			13729	
2070	24	408	804		518	510			639			14239	
	25	408	804		518	510	456		639			12788	
	26		804		518	510	456		639			12380	
	27		804	584	518	510	456	252	639			12170	
	28		804	584	518	510	456	252	639			10689	
	29		804	584	518	510	456	252	639			10689	
	30			584		510	456	252	639			9009	
	31			584		510	456	252	639			8525	
	32			584		510	456	252				7887	
	33			584		510	456	252				4702	
	34			584				252				3736	
	35			584				252				3736	
2085	36											2900	
	37											2900	
	38											2900	

Pioneer Tract



Pioneer Mine Reclaimed Acres



Dragline	Acres Mined	Years Mining	Average (ac/yr)
Red	7,348	29	253
Orange	4,468	23	194
Yellow	4,665	29	161
Purple	4,628	23	201
TOTAL	21,109		